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ABSTRACT

Britain's Open University, a significant departure from the conventional university, is described, contrasted, and compared with its traditional counterparts. This paper examines the economic implications of establishing an open learning system in the United States, while emphasis is placed on the history and structure of the Open University, output and costs of the Open University, cost comparisons of the Open University and conventional universities, and changing aspects of resource allocation. Appendices include course offerings, student characteristics and demand for the open university, cost calculations for conventional universities in the United Kingdom, and cost estimates of an open university in the United States. (MJM)

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THE OPEN UNIVERSITY: A SURVEY AND ECONOMIC ANALYSIS

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CHAPTER 1

Introduction

Today in higher education increasing attention is being focused on the problem of maintaining or improving output performance with relatively fewer resource inputs. Despite the rapid growth of technological progress in the communications industry, institutions of higher learning, with few exceptions, have resisted the adoption of new media in the teaching field to any significant degree even though research results suggest that quality could be maintained at substantially reduced costs with the adoption of new technologies. The reasons for the resistance have been well documented in other publications.[1] This paper describes in detail a significant departure from the conventional university and attempts to contrast and compare, in many dimensions, an innovative institution--Britain's Open University--with its traditional counterparts. It attempts also to examine the economic implications of establishing an open learning system in the United States. The timing of this report appears to be opportune because of the growing interest in establishing such an institution in the United States.

The Open University of the United Kingdom constitutes the first major attempt in university education to use the media of television and radio for all formal lectures in every course offered. Another innovative feature is that academic or ability prerequisites are nonexistent. Students are allowed to take no more than two full courses per year and only 10 percent of the Open University students have indeed taken two courses. Thus for the large majority only one full course is taken per year. The full-year course lasts from January until examination time in November with two breaks during this period. A typical full course consists of 16 television programs of 25 minutes' duration. These programs are shown during evenings from 6:30 to 7:30 and on Saturdays and Sundays; each program is repeated once. Complementary radio programs of equivalent length are broadcast, also during the evenings and on weekends. Each full course has 32 such broadcasts, each repeated once.

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[1] See, for example, K. G. Lumsden (Ed.), Efficiency in universities: The La Paz papers. (Amsterdam: Elsevier, 1974.)

The Open University student receives monthly, by mail, materials and homework assignments; it is the student's responsibility to return to the central administration the homework assignments which are graded and mailed back, and which help determine the final grade in the course. The students also attend bimonthly (normally) tutorial sessions held in local colleges primarily, where the mass-media lectures are discussed and clarified and where course problems are analyzed. The student has access also to counselling services in the same local institutions. The counselling services are available to help the student with both academic and personal problems.

Although the summer school policy is under review, the student currently is required to attend for six days a summer school held in one of eight centralized universities.

Failure to complete a sufficient proportion of home assignments or to attend summer school makes the student ineligible to sit for the November examination which constitutes 50 percent of the final grade.

While fees vary by level of course, the typical undergraduate tuition fee being approximately $60 per course, total tuition fees paid in any one year will meet less than 10 percent of the total annual cost of the Open University, the remainder being financed through a central government subsidy. Students initially are responsible for payment of these tuition fees, but they may apply to their local education authorities for grants to cover costs incurred in attending the Open University.

In the analysis of the Open University which follows it is important to recognize differences between the United Kingdom and United States usage of several words and expressions and to clarify the meaning of certain terms. In United Kingdom parlance, faculty refers both to faculty members and also to an academic discipline. For example, the "faculty in the science faculty" refers to teaching faculty members in those subjects included under the general heading of science. Tuition, in the United Kingdom, refers to the learning process and not to the fee payable as would be the case in the United States. Tutorials in the United Kingdom are a common feature in all universities and take the form of an instructor lecturing to, or discussing issues with, small groups of students.

Teaching costs are defined to include all costs incurred in providing students with their university courses with the exception of students' opportunity costs, and do not refer solely to instructors' salaries.

Fixed costs are those costs which are independent of student numbers, whereas variable costs are positively correlated with student numbers.

Finally, as would be expected with an innovative institution, changes are occurring constantly as the Open University learns by doing. As a consequence many of the cost data, to take one example, have changed and will continue to change in the evolutionary period. Where it is felt that certain costs will be or could be significantly different in the future or under other institutional arrangements, the necessary adjustments have been attempted in this report. Also, it has now become apparent that the costs of providing that variety of course offerings which was initially thought necessary by the founders of the institution will be beyond its present resources, particularly if existing budgetary constraints are continued by future governments. After three years of operation, actual resource requirements are now obliging the Open University authorities to examine the direction of the Open University and, in particular, to question the allocation of resources within it. The whole area of student preference, and its intimate relationship with resource allocation, is now under review.

In addition to the reexamination of its aims, the Open University is also looking again at its teaching techniques. Serious study of the effects on student learning of qualitative differences in television and radio programs is now under way and changes are being made in the tutorial and counselling system. The effect of these changes would appear to be a shift in emphasis from the counselling to the tutoring role though little information is as yet available on the reappraisal of the methodologies.

CHAPTER 2

History and Structure of the Open University

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With the publication in 1963 of the Robbins Report[2] evidence became available for the first time in the United Kingdom of the increase in demand for places within the entire higher education system--all post-high school education where the level of work/study was of degree quality. Later in 1963 the leader of the Opposition Labor Party, Mr. Harold Wilson, expressed his anxiety about the growing problems of students qualified to attend university for whom no places were available. He proposed that a university be established which would teach primarily through the media of radio and television. His suggested title for this institution was "The University of the Air." In February 1966 came the publication of a White Paper[3] on the subject. (In the intervening period, Wilson had become Prime Minister with the election of the Labor government in 1964). While the White Paper received a mixed reception in both the country at large and in the academic community, the government announced its intention to go ahead with the project but with major changes. The most significant alteration was embodied in the change of name--the Open University--since traditional university entrance requirements were completely abandoned. The other aspect of "openness" lay in the fact that students would be able to choose, almost without restriction, from any faculty courses which would contribute to their degree. In October 1967 a committee under the chairmanship of Sir Peter Venables, Vice-Chancellor of the University of Aston, Birmingham, was established. It was given the following terms of reference:

> to work out a comprehensive plan for an open university as outlined in the White Paper of February 1966, "A University of the Air," and to prepare a draft charter and statutes.

The Open University received its Royal Charter in May 1969. This confers on the University degree-awarding powers.

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[2] The Report of the Committee on Higher Education in the United Kingdom under the Chairmanship of Lord Robbins. (London: H.M.S.O., 1963.)

[3] A White Paper is an official government publication setting out the discussions which have taken place on the subject in question and inviting further debate and comment.

Degree Requirements[4]

Only one undergraduate degree is offered--the Open University Bachelor of Arts degree--but it is offered at an ordinary or Honours level. Table 1 distinguishes the requirements. The Open University degree is based upon the Scottish university degree system rather than the English. In Scotland students typically begin university one year earlier than their English counterparts. The entering Scottish student has followed a general course of education in five or six subjects and on the average takes three full-year courses during the first year at the university. In England, these three subjects are studied in depth during the final year at high school. In the Scottish university an ordinary degree is awarded with the accumulation of seven year-long course credits, two of which must be at an advanced level. The Open University degree, as seen in Table 1, is similar, with the two first levels plus four advanced levels being considered equivalent to the Scottish five first levels plus two advanced. Apart from the fact that the first Vice-Chancellor, Walter Perry, was a Scot, it was felt that the Scottish system was more suitable for potential Open University students, since the first-year or foundation courses were intended not only to introduce the students to subject areas (arts, social science, mathematics, science), but also to develop necessary study habits. A description of all available and planned courses may be found in Appendix I.

Government of the Open University

Similar to conventional United Kingdom universities, the Open University has a general council and a senate. The general council, composed of leading public figures, is concerned with the general welfare of the university while the senate, composed of all full-time academic staff and appointed ex-officio members up to a maximum of 20 percent of total membership, is concerned first with the daily operation and management of the university and second, with long-term planning and resource allocation. The composition

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[4]The ordinary degree necessitates the accumulation of 6 credit units. A full-year course is rated 1 credit unit. Fractions of credit units are obtained for the completion of part-year courses.

Table 1

Degree Requirements

	Ordinary B.A.	Honors B.A.
Foundational Level	2 Full Courses	2 Full Courses
Second Level	4 Full Courses	4 Full Courses
Third/Fourth Level	--	2 Full Courses

and operation of the senate are currently under review in order to give more weight to the opinions of the part-time academic staff which has actual contact with the students.

To give credibility to Open University degrees, a critical role is played by the Academic Advisory Committee established under the Royal Charter. While each new university must have a similar body, the Academic Advisory Committee of the Open University has an even more vital function to perform than usual because of the innovative nature of the institution and the unknown academic quality of the student body.

Staff of the Open University

Full-time staff. The full-time faculty can be divided into two distinct groups. One group, primarily concerned with course development is located in the Milton Keynes Campus, the administrative headquarters of the Open University. Recruitment of this faculty began in January 1969. The aim was to provide this group of faculty with conditions of service equivalent to those existing in conventional universities--specifically, equivalent research opportunities and concomitant facilities. In terms of the production of course materials, it was estimated that four faculty members in each of twenty-two disciplines would be sufficient to achieve the desired objectives and provide intellectual cross-fertilization within each discipline. This number has proven to be quite inadequate to the extent that additional recruitment[5] has been necessary, but the additional faculty has not solved the course production problems. Table 2 shows the distribution of faculty and administration immediately prior to the first intake of students in January 1971.

The second group of full-time faculty consists of senior counsellors and staff tutors based in 12 (later 13) regions in the U.K. Each region is the responsibility of a director who is also a full-time faculty member. Table 3 summarizes the numbers of organizational staff in each region. The senior counsellors' role is establishing a network of counselling services

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[5]Both faculty and administrative jobs were widely advertised, and the ratio of applicants to jobs was approximately 40 to 1.

Table 2

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Number of Full-Time Staff by Faculty at January 1971[a]

Faculty, etc.	Deans/ Directors	Professors	Readers and S/Lecturers	Lecturers	Sec., Tech. & Admin. Staff	Total
Arts	1	4	5	11	9	30
Social Sciences	1	4	6	10	10	31
Educational Studies	1	2	1	5	5	14
Mathematics	1	3	5	9	11	29
Science	1	4	8	9	18	40
Technology	1	4	2	8	9	24
Institute of Educational Technology	1	1	2	6	5	15
Total	7	22	29	58	67	183

[a]Reprinted from The Early Development of the Open University: Report of the Vice-Chancellor. The Open University, Walton Hall, Bletchley, Bucks, 1972, p. 12.

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Table 3

Number of Regional Office Staff at December 1970[a]

Region & Office	Director	Assistant Director	Administration	Clerical	Total
01 London	1	1	2	8	12
02 Oxford	1	1	2	11	15
03 Bristol	1	1	2	7	11
04 Birmingham	1	1	1	8	11
05 Nottingham	1	1	1	8	11
06 Cambridge	1	1	3	6	11
07 Leeds	1	1	1	6	9
08 Manchester	1	2	4	14	21
09 Newcastle	1	1	1	7	10
10 Cardiff	1	1	1	5	8
11 Edinburgh	1	1	3	9	14
Headquarters	1	1	3	4	9
Total	12	13	24	93	142

[a] The Early Development of the Open University, p. 16.

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conducted by part-time counsellors, and the staff tutors' role is the establishment of the tutorial services, again carried out by part-time tutors.

Part-time staff. In each region there are many study centers normally open most evenings and on Saturday mornings, at which times the counsellors meet with students. The role of these counsellors is to establish personal contact with the students to discuss possible problems, to assist and advise them about their studies, but not normally to teach. The counsellor is also responsible for the smooth operation of the study centers. Typical counsellors have a full-time appointment elsewhere, normally in educational establishments, and are in charge of 20 students with whom they have continuous contact over the academic year.

Tutoring takes two definite forms. One set of tutors is concerned only with correspondence, i.e., the grading of home assignments, and they have no physical contact with the students. The second set of tutors meets at least once a month with students in a face-to-face tutorial situation. The content of the tutorials is on some occasions determined by the staff tutor and at other times is negotiated in consultation with the students themselves. By early 1971 there had been appointed 1131 counsellors, 2140 correspondence tutors and 1590 class tutors. Table 4 summarizes the full-time jobs of the above individuals.

Student Characteristics

The Robbins Report estimated that about 100,000 adults who had never had advanced education might apply to the Open University, as well as an additional 250,000 persons who had already taken advanced courses not leading to a degree (e.g., school teachers). Moreover, each year there are about 30,000 students who apply to conventional universities but are not accepted by them, owing to the shortage of places. These, and the approximately 40,000 annual high-school dropouts, might ultimately (at age 21) wish to avail themselves of the Open University option. Since it was not known how many adults of all backgrounds might actually apply, the Open University decided it could offer about 25,000 places in its first year, with plans to

Table 4

Source of Part-Time Staff[a]

Institution or Other Origin	Percentage
University	19
College of Education	13
Polytechnic	13
Technical College	8
College of Further Education	8
Secondary School	7
Government Research Institute	2
WEA and Extra-Mural	2
Industry	2
Local and Central Government	1
Other[b]	17
No Reply	8

[a] The Early Development of the Open University, p. 19.

[b] E.g., housewives, retired persons, postgraduate students and part-time employees of the institutions listed above.

achieve, within two to three years, a maximum student population of 55,000. In 1971, therefore, 24,191 applications were accepted. All applicants were over 21 and were selected on a first-come, first-served basis, after initial screening for the purpose of achieving a balanced geographical, subject, and occupational mix. A detailed discussion of student characteristics and demand for the Open University will be found in Appendix II.

University Facilities

The main University facility which houses the central administration and full-time, on-campus faculty and staff is located in Milton Keynes around Walton Hall, a Georgian manor house standing on 70 acres. Table 5 summarizes the existing buildings and building programmed to late 1975.

Many University activities, however, will emanate from centers and offices within the 13 regions. One of the major instances of economy in the Open University, which incidentally also uses national higher educational facilities more efficiently, occurs through the employment of underused educational capacity. In urban areas the majority of study centers (total equals 273) are housed in polytechnics (institutions of higher education originally specializing in applied science and technology but now become broader based) and in technical colleges. Only 12 are housed in universities. Such an arrangement is possible because these institutions, relatively fully occupied during weekdays, have large amounts of unused facilities during evenings and weekends. In rural areas where such colleges are less prevalent, high school facilities are normally used. Ideally the capital requirements in the facilities include projectors and tape replay machines, reference sets of correspondence materials (the same sets that students receive) and, in some area centers, teletype terminals linked to a national computer; the terminals are used mainly for mathematics students.

Many of these institutions also make facilities such as libraries and common rooms available to Open University students and staff. The flow of benefits is not all one way since many of the institutions within which Open University capital equipment is installed are allowed use of the equipment during their regular classes.

Table 5

The Revised Building Program[a]

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Phase	Building	Starting Date	Scheduled Completion Date
I	Faculty Building	March 1969	September 1969
	Catering Building	May 1969	October 1969
	Walton Hall Conversion	July 1969	November 1969
	Science Preparation Laboratories	September 1969	April 1970
II	Phase II Complex Consisting of:	January 1970	
	Correspondence Services Block		October 1970
	Registry Block		December 1970
	Data Processing Block		December 1970
	Computer Block		January 1971
	Media Block		February 1971
	Secretariat Block		March 1971
	Photographic Block		July 1971
	Lecture Theatre		December 1971
III	Extension and Alterations to:		
	Catering Building	March 1971	May 1972
	Extension to Faculty Building	April 1971	December 1971
	Operations Center Extensions	September 1971	May 1972
	Library	June 1972	June 1973
	Science and Technology		
	(2 Blocks)	October 1972	October 1973
	(1 Block)	April 1973	October 1974
IV	Mathematics	March 1973	March 1974
	Studios	August 1974	April 1976
	Residence	April 1974	October 1975

[a]The Early Development of the Open University, p. 28.

As will be seen in the section on costs of the Open University, the real marginal costs incurred in using existing facilities in polytechnics, technical colleges, schools, etc., are not aways borne by the Open University. The decision as to who bears the costs is made by the authority responsible for the facilities. In some instances a nominal rental charge is made, in others incremental costs are charged, and in still others the facilities are provided at zero cost to the Open University and are borne by local or central government. On the other side of the coin, however, the Open University does not charge the resident institutions for the use of the equipment it has installed in the study centers.

While students are not obliged to take part in the study center tutorial sessions, they must attend a one-week-per-course resident summer school to be eligible to take the final examination. All summer schools are held in universities [in 1971 Bangor (Wales), Durham, East Anglia, Exeter, Keele, Loughborough, Stirling (Scotland), and York]. One distinguishing feature of the chosen eight (mostly very new universities) is the availability of on-campus accommodation facilities. The Open University stresses the importance of those summer schools as an integral part of each course. The week-long session provides for intensive study and gives students an insight into conventional university life. Students pay, either from their own pockets or from local government grants, approximately $60 for first-level courses and $85 for higher-level courses for these summer sessions. The difference in price reflects economies of scale which result from differences in class size; these prices are set to cover all costs incurred by the Open University in offering summer schools.

All of the above study services are coordinated by the Regional Tutorial Services Board consisting of all the regional directors plus certain members of the central administration. The Board, which meets regularly, deals with all aspects of regional work and has set up committees to handle study centers, audio-visual provisions, finance and personnel, computer terminals, tuition and counselling services to the students, and the large question of student participation.

CHAPTER 3

Output of the Open University

Since the Open University is in its third year of operation and since the first two years' students have taken end-of-year examinations, results are now available for the four original foundation courses in 1971 and for the five foundation courses in 1972.

After completing a course and taking the end-of-year examination, a student may obtain a pass with distinction, a straight pass, or a fail. His final grade is determined by score in the end-of-year examination, in assessment of his performance in Summer School, and in written assignments during the academic year. Regarding the last named, the student submits both essay and objective assignments, the essays being graded by his correspondence tutor and the objective tests by computer. The number of such assignments varies by course. The range in tutor-graded assignments is from nine per annum in mathematics to thirteen in arts. The corresponding range for objective tests is seven in arts to thirty-one in science. In tutor-graded assignments only the best six submitted by each student are incorporated into his final assessment; also, not all computer-graded assignments are included. While a student is encouraged to undertake all assignments offered, the part-time nature of his studying is recognized, and such a system does not penalize a student finding considerable difficulty with subparts of any course or missing one or more assignments for personal reasons or reasons connected with his full-time employment. The continuous assessment program adopted by the Open University serves several purposes. It gives each student a regular progress report which includes detailed comments by his tutor, but it also provides the University with information on how various groups of students are assimilating the material allowing remedial supplementary materials to be prepared for those parts of courses proving particularly difficult. It is assumed that this is a temporary problem and that remedial materials can be prepared in advance when data are available after a course has been given. In the interim period, however, since the Open University has obvious constraints, owing chiefly to the inflexibilities associated with prescheduled radio and television programs and prepared correspondence

materials, necessary modifications can only be introduced into the system through the tutorial program. In evaluating pass/fail rates for the Open University, one must exercise considerable caution in interpreting the significance of any percentage figure since most quoted pass rates use, as a base, the number of students actually sitting for the end-of-year examinations.

Table 6 summarizes foundation course pass/fail ratios for 1971 and 1972.

As can be seen from Table 6, there was a steady attrition from initial enrollment to the taking of the end-of-year examinations. The attrition rate, however, varied significantly by faculty, being particularly high for mathematics and science. Table 7 summarizes the attrition rates for 1971 and compares overall rates between 1971 and 1972.

Whether or not the attrition rates shown in Table 7 are high or low is a matter of value judgment. What can be explicitly stated, however, given the small number of students in blue-collar occupations attending the Open University, is that the attrition rate cannot be explained in terms of high dropouts on the part of this group alone. The "relatively high" rates for mathematics and science might well be explained by the structured nature of these subjects and the fact that "very high" attrition rates are also experienced in these subjects throughout United Kingdom adult education.

What is clear from Tables 6 and 7 is the fact that of the 28,850 initial course enrollments in 1971 (24,750 students, of which 4,100 enrolled for two courses--the maximum allowed) only 16,341 passes (14,667 students were involved, of which number 1,608 passed two courses) were recorded, while in 1972 there were 16,228 passes. Thus, omitting possible students exempting foundation courses, there were, in 1972, less than 15,000 students eligible to take a new course, i.e., either another required foundation course or second-level course, and in 1973 less than 14,000 of those entering in 1972. It is extremely hazardous to make estimates on how many students initially enrolling in the Open University will actually complete a degree. One reason for this statement is that successful completion of one course out of six is not indicative of successful completion of the program. Supporting evidence for this can be found, for example, in United Kingdom further-

Table 6[a]

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Initial Registrations		Final Registrations		Took Examinations		Passed Examinations		Failed Examinations	
1971	1972	1971	1972	1971	1972	1971	1972	1971	1972
28,329	29,824	21,715	22,799	17,666	17,750	16,346	16,228	1,320	1,522
100%	100%	76.7%	76.4%	62.4%	59.5%	57.7%	54.4%	4.7%	5.1%

[a]It should be recalled that students, by not having to pay tuition fees until the end of April, were implicitly given 3 months to decide whether or not to continue with the course(s) for which they had initially registered. Source: Open University Statistical Bulletin Feb./March 1973. Tables 1A1 & 1A2.

Table 7

Attrition Rates by Faculty

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Faculty	Percentages of Students "Dropping Out" between					
	Initial Enrollment and May Enrollment		May Enrollment and Examination Enrollment		Initial Enrollment and Examination Enrollment	
	1971	1972	1971	1972	1971	1972
Arts	19%		12%		29%	
Social Sciences	23%		16%		35%	
Mathematics	33%		26%		50%	
Science	26%		22%		42%	
Technology						
Total	25%	23.6%	19%	21%	39%	42%

education courses in which a group of subjects must be passed before a certificate is awarded. While many students successfully complete initial courses, the number completing all the required courses is very small. As with the Open University, the actual length of time involved in obtaining the qualifications is a major factor contributing to the attrition rates. Further discussion of numbers graduating from the Open University will be found in the concluding section.

Open University Faculty Opportunities for Individual Research

At the time of the appointment of the Open University full-time academic staff, it was declared that the Open University conditions of employment would be the same as those of conventional university staff and, in particular, that the "normal" amount of time would be set aside for the staff's research interests. In actuality, the demands upon academic staff for the production of course materials were grossly underestimated, with the result that little or no research time was available. Because of this situation, the research interests of the staff have been neglected (with the exception of ongoing research projects imported to the Open University by staff appointments from other universities). The hiring of additional faculty and the improvement in conditions which will be occasioned by meeting the initial course materials preparation deadline should in time allow the Open University faculty the opportunities to pursue their research concerns.

Research into the Open University

The major field of research undertaken by the Open University is a five-year study, financed by a grant from the Social Science Research Council, of the progress of the Open University students. The first generation of students will be followed through their courses to graduation and beyond, if resources allow. In addition to providing valuable information which the Open University will be able to base future planning decisions on, it is intended that the study will ultimately allow effective comparison to be made between other social and educational innovations and the Open University.

Reference has already been made to the problem of the heterogeneity of the student body in terms of age, occupation, and educational background.

One important aspect of the study will be to try to determine, by age group, the effect of obtaining an Open University education on the status of the student. In view of the relatively small initial numbers and the predicted high dropout rate of students in the blue-collar occupations, difficulties over the statistical validity of the results obtained may arise. Presently, a special problem in this area is the population of women students (approximately 35% of entrants in 1971). Although some 60% of women students are in full-time employment, job decisions by women are frequently made within the constraints of family commitments and husbands' occupations, and are therefore not strictly comparable with male students' decisions. In spite of the conceptual and statistical difficulties mentioned, this area of research should provide insights into problems which are the immediate concern of a large part of the world, namely the short- and long-term effects of educational inputs on particular socioeconomic groups.

An important research question which the Open University staff is currently concerned with arises from the fact that the combination of materials and teaching techniques is unique as a university system and is serving a group of students widely diverse in many characteristics. Since the learning process itself for conventional students is extremely complex and little understood, the problems are magnified as student homogeneity decreases. The research in this area will attempt to identify the contribution of various factors to the learning process within different student groups; courses and the supplementary and remedial materials will be modified in the light of the findings. It is the present intention of the Open University to revise courses every four years, but this intention itself is subject to revision as more information is made available by the research team.

Production and Use of Materials by the Open University

The Open University prepares, manufactures, and distributes some of its own materials, especially workbooks geared to the radio and television broadcasts; but where standard texts are prescribed for the courses, it relies on the commercial market. In the latter area, agreements have been reached with publishers, and significant reductions in the selling prices achieved. The actual cost of the prescribed texts by faculty in 1971 were:

Arts	$14.25
Social Sciences	25.00
Mathematics	1.80
Science	13.25

Workbooks and correspondence materials are not included in the above; the course tuition fee covers these costs. These Open University materials are also available to the general public through a central wholesale outlet as well as through normal retailing channels.

In addition to those sales, the Open University has also made tentative arrangements for the adoption, on a trial basis, of three of its foundation courses. Since the fall of 1972, three United States universities (Houston, Maryland, and Rutgers) have been experimenting with the arts, mathematics, and science courses. The experiment is being supervised by the College Entrance Examination Board under a Carnegie Corporation grant and evaluated by Educational Testing Service, in Princeton. About 800 students are involved, some of whom are studying on campus while others are studying at home in a similar fashion to their United Kingdom counterparts. The Open University has concluded an exclusive publishing contract with a United States publisher for sole distribution rights of its own materials.

The commercial viability of the sale of Open University courses and materials has important economic implications not only for those institutions purchasing them but also for the Open University itself, since this may prove to be one method of financing its expansion to planned optimum size despite the cutback in government subsidy. It is of interest to note that in 1972 sales of Open University materials realized a net profit of some £38,000.

Conversion Rates

In analyzing the economics of the Open University and in comparing it with conventional United Kingdom universities, certain calculations have to be made to achieve valid comparisons.

To compare Open University students, for example, with conventional students, adjustments have to be made in the latter figure since the conventional student body is composed of both graduates and undergraduates,

whereas almost all the Open University students are, at present, undergraduates. The adjustment is necessary since different student groups require different resource inputs, e.g., faculty time, library facilities, laboratories, and equipment. The official United Kingdom estimates use a numeraire "unit of undergraduate load." Table 8 shows the ratios used to convert students into undergraduate equivalents.

Another adjustment required in making meaningful comparisons arises from the part-time nature of the Open University students. All of the Open University students are part-time (since no student is allowed to take more than two courses) in any one year. In contrast, only 9 percent of students attending conventional universities were part-time in the academic year 1968-69. Table 9 shows the full-time equivalent undergraduate total for United Kingdom conventional universities' students.

As can be seen from Table 9, a part-time undergraduate student, for example, is treated as being equivalent for costing purpose to one-half a full-time undergraduate. Since conventional universities cater only in very small part to students who are not full-time, the rationale for use of this ratio might be as follows. A student on a part-time degree program might attend evening and/or weekend classes for four to six years and attend university full time during his final year, though an infinite number of variations exist on this pattern. Because of this wider spectrum of possibilities, making cost-equivalent calculations is fraught with uncertainty. What is definite is that many part-time students use resources which otherwise would remain idle, and consequently many real marginal costs are negligible. In the study the part-time equivalent ratios contained in Table 9 will be used.

Another conversion problem arises in comparing graduates of the Open University with their conventional counterparts. In the Open University it will be assumed that only undergraduate degrees will be produced and that each Open University graduate will be equivalent to a first-degree graduate from conventional universities. Conventional universities also produce Honours, diplomas, and postgraduate degrees. Thus in comparing costs between the Open University and an "equivalent" conventional university, a weighting

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Table 8

Conversion Rates to Undergraduate Equivalents

Type of Student	Undergraduate Equivalent
Undergraduate	1
Postgraduate in Education	1
Postgraduate in Science	3
Postgraduate in Medicine	3
Postgraduate in Arts, Humanities, and Social Science	2

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Table 9

Conversion Rates to Full-Time Undergraduate Equivalents

(United Kingdom Conventional University Students 1968-69)[a]

	Number	Weight	Full-time Undergraduate Equivalent
Full-time			
Undergraduates	173.510	1	173,510
Postgraduates in Education	6,841	1	6,841
Postgraduates in Science & Medicine	18,695	3	56,085
Postgraduates in Arts, Humanities, & Social Science	12,248	2	24,496
Part-time			
Undergraduates	4,615	0.5	2,308
Postgraduates in Education	2,684	0.5	1,342
Postgraduates in Science & Medicine	7,601	1.5	11,402
Postgraduates in Arts, Humanities & Social Science	5,943	1	5,943
Total	232,137		281,927

[a]Sources: University Grants Committee statistics of education, 1969, vol. 6; and The report of the Committee on Higher Education. Appendix IV. (London: H.M.S.O., 1963.)

scheme must be adopted for the different degrees. It is extremely difficult, because of joint-cost problems, to estimate precisely the cost of any one degree in an institution which provides regular undergraduate degrees, diplomas, and postgraduate degrees. Because of this, two sets of assumptions governing postgraduate degrees have been made. Table 10 sets out these assumptions and the assumption adopted by the University Grants Committee (U.G.C.) that two diplomas equal one undergraduate degree.

Of greater significance for an estimate of Open University graduates might prove to be the number of course exemptions granted to incoming students, and a significantly lower dropout rate than assumed above for students successfully completing the first year. At this stage in the history of the Open University it would be hazardous to estimate what rates are likely to prevail in long-run equilibrium. On the other hand, ignoring such factors will bias downwards the percentage of incoming students who will eventually graduate. Consideration of the exemption factor may be even more significant for an American Open University because of the large number of students with some college background.

While it may not be possible for future Open University students to maintain either the exemption rate or low second-year dropout rate exhibited in 1973 by current students, and while these rates may bear little resemblance to the rate which might prevail in the United States, their magnitude and potential significance compel attention.

Table 11 shows numbers of finally registered students by year of entry to the Open University. As can be seen from the first column, of the 24,122 students finally registered in 1971, 15,981 registered in 1972 (66%), and of this number 12,939 registered in 1973 (81%). From the second column it can be calculated that 58% of the 1972 finally registered students also registered in 1973. Thus the 37,042 total of finally registered students was made up of approximately equal proportions of 1971, 1972, and 1973 initially registered students. Perhaps the most striking figure in the table is the 12,939 students returning for their third year.

The 12,303 students initially registering in 1973 are studying a total of 13,219 courses, the bulk of which are foundation courses: i.e., one-unit courses (with the exception of 225 M.S.T. half-course students). Only 7.4%

Table 10

First Degree Equivalent Graduates in United Kingdom Conventional Universities in 1969[a]

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First Degree Graduates	Diplomas ÷2	Postgraduates x 1	Postgraduates x 2	Total Assuming PG. x 1	Total Assuming PG. x 2
44,820	6,736	10,245	20,490	61,801	72,046

[a] U.G.C. Statistics of Education, 1968-69 (HMSO, 1970).

Table 11

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Finally Registered Students by Year of Entry

Year	Year of Entry 1971	1972	1973 (July)	Total
1971	24,122	--	--	24,122
1972	15,981	20,466	--	36,447
1973	12,939	11,800	12,303	37,042

of these students are studying more than one course. The implication of the 7.4% statistic is that 92% of these students would require the full six-year period (i.e., one course per year for six years) to obtain the ordinary B.A. degree. There is, however, an exemption system in operation. This system exempts students with specific formal educational qualifications from up to three course requirements. Table 12 shows the total number of exemptions awarded to date to Open University students applying for exemptions. From Table 12 it can be seen that 29,304 students have applied for exemptions. Of this number 26,953 (29,304 - 1991 for whom no exemption was given + 360 for whom one "discretionary" award was allowed) were granted at least one exemption. It is not known at this stage how many students with exemptions have dropped out, but it is reasonable to assume, and there is supportive evidence for the assumption from the first two years' operation, that those students with the highest formal educational qualifications, and therefore with the highest number of exemptions, have also had the lowest dropout rates. The total possible number of exemptions given, including "discretionaires," was 65,000 (4201 x 1 + 4008 x 2 + 2697 x 3 + 360 x 1 + 3642 x 2 + 12,405 x 3). If a 20% dropout rate is assumed for students with exemptions, this leaves 52,000 "course" exemptions for a student body of 37,000: i.e., 1.4 exemptions per student (52,000 ÷ 37,000) which shortens the average length of time to degree to 4.6 years. Since each student also takes, on average, 1.1 courses per year, the total length of time to degree reduces to approximately 4 years.

Table 13 provides further data for the calculation of the O.U. output. It shows the number of registered second-level courses at the beginning of 1972 (students taking these courses are continuing Open University students; i.e., they are in the second year of study), number of courses examined, and pass, fail, and dropout percentages. Table 13 may be compared with Table 6. This comparison demonstrates that, while the average foundation course pass rate in 1971 and 1972 was 56% (1971 57.7%, 1972 54.4%), the second-level course pass rate in 1972 was 70%. While there are obvious dangers in drawing conclusions from one or two years' operations, the information available to date on dropout rates for 1973 at foundation level and at second level appears to support the belief that the major obstacle for the Open University student

Table 12

Students Receiving Credit Exemptions by Year by Type

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Year	Number of Students Awarded: 0 Credit Exemptions	1 Credit Exemption	2 Credit Exemptions	3 Credit Exemptions	0 Credit Exemptions, +1 Discretionary Exemption[a]	1 Credit Exemption, +1 Discretionary Exemption	2 Credit Exemptions, +1 Discretionary Exemption	Total Number of Students
1971	766	1,687	1,746	495	185	1,830	4,716	11,425
1972	644	1,229	1,059	964	81	918	3,137	8,032
1973	581	1,285	1,203	1,238	94	894	4,552	9,847
Total	1,991	4,201	4,008	2,697	360	3,642	12,405	29,304

[a]Discretionary exemptions are awarded to holders of approved teaching qualifications.

Table 13

1972 Second-Level Courses Examination Results

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	(1) Registered Courses in Jan. 1972[a]	(2) Allocated to Examination Centers	(3) Examined	(4) Passed	(5) Failed	(6) Absent from Examination
No. of Students	24,349	21,349	18,326	17,096	1,230	3,023
Pct. of No. in Col. 1	100%	87.6%	75.2%	70.1%	5.1%	12.4%
Pct. of No. in Col. 2	--	100.0%	85.8%	--	--	--
Pct. of No. in Col. 3	--	--	100.0%	93.3%	6.7%	--

[a]Source: Open University Statistical Bulletin (February/March 1973). Continuing students who have not registered by end of January are considered to have left the Open University (at least for that year).

is the first year's study. Success in that year virtually guarantees that the student will return for the next academic year.[6] In addition, a further 25% of students failing to gain a credit in their first year and 20% failing continuing students will register for courses in the following year.[7] It is not yet known what the effect of a subsequent failure would be for either of these groups, but it will be assumed in the calculations which follow that 50% of both groups will subsequently fail to obtain a credit and will leave the university.

In the earlier analysis it was assumed that an equal proportion of successful students dropped out in each subsequent year of study. If, in fact, the actual 1971-1973 rates and trends are maintained, in the long run the dropout rate, after the first year, will fall to 30%, and this percentage may reduce as students approach the necessary number of credits for a degree. In order to calculate the actual cost per degree (assuming that the future Open University population maintains the characteristics of the present population, i.e., that each student takes 1.1 "courses" per year and is given 1.4 "course" exemptions, it is necessary to construct a table which will show the student population by year of intake into the University. To simplify the calculations, figures will be rounded to the nearest 100. Table 14 shows intake figures, populations by years, and graduation projections employing the information above.

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[6] Open University Statistical Bulletin, February/March 1973, Table 1G2. Table 1.

[7] Ibid., Table 1G2, Table 2.

Table 14[a]

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Year	A Year 1971	B Year 1972	C Year 1973	D Year 1974	E Year 1975	F Year 1976	Graduates
1971	21,100	--	--	--	--	--	
1972	16,000	20,500	--	--	--	--	
1973	13,200	12,300	17,000	--	--	--	
1974	9,200	8,700	10,400	15,000	--	--	
1975	6,100	5,700	7,500	9,200	15,000	--	4,300
1976	1,800	3,700	4,800	6,600	9,200	15,500	3,900

[a]Intake figures for 1975 and 1976 will have to be raised if the 1975 graduate number is accurate.

CHAPTER 4

Costs of the Open University

The reason for assessing the costs of the Open University is to establish a basis on which this particular educational method can be compared with the conventional university system. The Open University represents a fundamental change both in the method of education and in those to whom it is offered; this being the case it involves a number of issues related to efficiency in the use of educational resources which could have far-reaching consequences. Therefore, it is essential to approach the problem with caution and with due regard to the difficulties of concept and empiricism which arise in this type of work.

The first problem is that the costs which are collected are dependent on the use to which they are to be put. For example, the Open University can be compared in total with the other types of university, and this merely requires an indication of the average costs per student or per course in both cases; but if the intention is to compare the costs of varying the capacity of the two types of university, marginal cost data will be required. Unfortunately marginal data are notoriously difficult to extract from any organization; the main reason for this, which should be borne in mind throughout this analysis, is that accounting data and economic data are not always the same thing, and it is normally the former which are available. The economist often is forced to use accounting data for purposes for which they were not originally intended and has to make a series of approximations and estimates. It will be found that this study is no exception.

Since the Open University was close to being in steady-state equilibrium in 1973--i.e., had approximately its full quota of undergraduates (over 37,000)--1973 will be used as a base for comparison purposes. The figures used constitute the actual Open University expenditures[8] in the financial

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[8]Since in the following section possible confusion might be created by converting British to United States prices using the official exchange rate, all calculations have been made in British £ (pounds sterling). In a later section, the factor inputs in the Open University will be costed in United States prices in order to price out the British Open University model in the United States higher education market. Using the official rate of exchange would of course price out the British Open University model in British relative prices.

year 1st January 1972 to 31st December 1972 and the Open University budgetary increases for 1973. In order to update the conventional university costs the University Grants Committee (U.G.C.) index of university costs for non-supplemented expenditure--which was 146.0 in 1972 and 164.3 in 1973--was used. These figures are presented in Table 15. In order to determine the actual cost per graduate, the 1972 Open University expenditures will be used and will be converted to 1973 prices using the U.G.C. index in Table 15. Since the 1972 costs are for a student body of 32,000, an adjustment will be made in the variable costs figures to allow for the increase in student numbers from 32,000 in 1972 to 38,000 in 1973. Table 16 summarizes Open University expenditures from 1st January 1972 to 31st December 1972 converting the 1972 costs to 1973 prices and increasing the variable costs by 18.75% (i.e., $\frac{6000}{32000} \times \frac{100}{1}$) to take account of the larger student body.

The way in which the figures for each item in Table 16 were calculated is discussed below.

Line 1. Capital Cost

Budgetary estimates for the expenditures necessary to provide the Open University with the required capital stock for steady-state equilibrium are detailed in Table 17.[9]

To date over two-thirds of the above total capital expenditures have been undertaken, and while it is possible that adjustments might occur in the total figure or within the different planned categories, it is not anticipated that the final figure will be significantly different from the estimate.

Thus taking the total of £9 m as given, the annual capital cost based on an expected life of 60 years (an annual depreciation rate of 1 1/2%, and an interest rate of 10%, is £1,035,000 (£ 9 x 11.5%). It is further assumed that almost all of the capital cost can be attributed to the production of

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[9] One possible additional capital expenditure involves an on-campus broadcasting center estimated at £3 m. This would increase the above total capital costs and decrease the annual B.B.C. costs. Since there is considerable uncertainty as to whether these expenditures will be made, broadcasting costs have been included, presupposing the current arrangements will continue in the future.

Table 15

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Percentage Increases in University Costs by Major Category 1971 - 1973

Year	Salaries (Supplemented Expenditure)[a]	Recurrent Expenditure (Non-Supplemented Expenditure)[b]	Total
1st January 1971	132.2	133.9	133.6
1st January 1972	142.8	146.0	144.9
1st January 1973	154.2	164.3	159.9

[a] Supplemented Expenditure is that expenditure which is automatically increased to take account of salary awards to academic staff.

[b] Non-Supplemented Expenditure includes all other costs (including wages of clerical, technical and maintenance staff).

Table 16[a]

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Fixed Costs in £000s

Category	1972 Prices	1973 Prices (+12.5%)	% of Total Costs
1. Capital	932	1,175	10%
2. Central Administration	956	1,076	9%
3. Regional Administration	1,264	1,422	12%
4. Faculties, Libraries, & Computer Services	1,290	1,451	12%
5. British Broadcasting Corporation	1,722	1,937	16%
6. Miscellaneous	1,031	1,160	10%
7. Total Fixed	7,195	8,221	67%

Variable Costs in £000s

Category	1972 Prices	1973 Prices (+12.5%)	1973 Prices (+18.75%)	% of Total Costs
8. Correspondence Materials (incl. Experimental Kits)	866	974	1,157	10%
9. Tutors & Counselling	963	1,083	1,286	11%
10. Summer Schools	736	828	983	8%
11. Data Processing	110	124	147	1%
12. Examinations	184	207	246	2%
13. Regional Administration	--	--	--	0%
14. Study Center Rentals	68	77	91	1%
15. Total Variable	2,927	3,293	3,910	33%
16. Total Costs	10,122	11,271	11,888	100%

[a]Source: The Open University Statement of Accounts for the Year 1st January 1972 to 31st December 1972.

Table 17

Planned Total Capital Expenditures

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	£000
Faculty and Library Buildings (including equipment and furnishings)	2,000
Science and Technology Buildings and Laboratories	3,000
Administrative and Operations Buildings	2,000
Miscellaneous (Cafeterias, Regional Buildings, etc.)	2,000
Total	9,000

undergraduate degrees and that research output will consume no more than 10% of the annual capital allotted. Therefore in order to estimate the proportion of the £1,035,000 used in providing teaching services, a 90% rate has been adopted. Thus the final annual capital cost figure of £932,000 is derived by multiplying £1,035,000 by 90%. In 1973 prices the figure is £1,049,000 (£932,000 x 112.5%).

Line 2. Central Administration Costs

The Central Administrative Department is composed of the following divisions: correspondence services, data processing, finance, information, publishing, marketing, academic administration, Vice-Chancellor's Office, and Council Affairs. Of these, data processing costs vary with the number of students and, consequently, are included under variable costs. Thus from the total amount of £1,066,000, data processing costs of £110,000 have been attributed to the variable costs section and the figure for central administration costs in 1972 prices is £956,000 (£1,066,000 - £110,000). In 1973 prices they are £1,076,000 (£956,000 x 112.5%). It is assumed that 100% of the cost is properly attributable to the undergraduate teaching activity.

Line 3. Regional Administration Costs

There are 13 regions covering the United Kingdom, each region having a director, a supporting administrator and clerical staff, 3 to 4 senior counsellors, and 5 to 7 staff tutors on average. On the main campus there is also a central regional staff consisting of a director and 6 to 10 supporting administrative staff. The Regional Administration costs are independent of student numbers and consequently are fixed. Total Regional Administrative costs also include rentals for study centers and tutoring and counselling costs, both of which could be expected to vary with the number of students enrolled. However, for the range within which the University plans to operate--i.e., 38,000-55,000 students--the number (and therefore the cost) of this staff is fixed. The total amount for this

category in 1972 prices is £1,264,000, all of which is attributable to teaching output. In 1973 prices, the amount is £1,422,000 (£1,264 x 112.5%).

Line 4. Faculties, Libraries, and Computer Services

Faculty costs consist largely of salaries and expenditures on the production of courses. In the calculation of expenditure on the production of correspondence units, faculties are charged by other areas of the Open University for services provided; e.g., publishing charge for copyright clearance and editing and media development charges for graphics production. In addition each faculty is allocated funds for consultants, external assessment, etc., per unit produced. Since the initial intention was to make Open University academic staff comparable in terms of research opportunities to their conventional university counterparts, one would be expected to allocate only part of academic staff output to teaching and the remainder to research. As will be seen, however, almost 100% of academic staff output has been required for course production. For this reason all of the academic salary costs will be attributed to teaching output. Faculty costs in 1972 were £1,501,000. Of this amount, £1,054,000 was paid in academic staff salaries, £121,000 in computer hire, and the remainder (£326,000) appears in the miscellaneous category. Library costs[10] totalled £115,000. The total for Line 4 in 1972 prices is, therefore, £1,290,000 (£1,054,000 + £121,000 + £115,000). In 1973 prices, the total is £1,451,000 (£1,290,000 x 112.5%).

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[10]The library is mainly a teaching library for the use of the central academic staff. Research work by the staff is often undertaken using the library facilities of other universities, especially Oxford and London.

Library facilities will be used, of course, by Open University students, but such facilities will take the form of the "local library" which is financed by local government and which is essentially free to users. All local libraries are sent lists of prescribed and recommended books for Open University courses by the Open University. Since it is the duty of the local library to meet the library requirements of the local population (no matter how specialized the demand) this cost element of the Open University does not appear in any Open University budget but is borne by local government.

Line 5. British Broadcasting Corporation Costs

Since the production and broadcasting costs of courses in any year will vary with the number of new courses being produced and the number of total courses being transmitted, it is necessary to estimate what these numbers will be in steady-state equilibrium; this state will not occur before or during 1973 and consequently allowance must be made for this fact.

The total number of equivalent one-credit unit courses proposed for 1973 is shown in Table 18. Thus the total number of foundation and second-level courses to be offered in 1973 is 24 in equivalent one-credit units.

In addition the Open University planned to produce 10 new credit unit course equivalents (hereafter "courses") in 1973, primarily at third and fourth level. It is further expected that 10 such new "courses" will be produced each subsequent year, particularly when remakes of the earlier produced "courses" commence in 1975. At this stage it is not known precisely how many, or what proportion, of existing and future "courses" will have to be completely or partially remade. It will be assumed that the Open University in 1973, if in steady-state equilibrium, would be producing 10 new "courses," revising a certain number equivalent in cost terms to 8 "courses" (the number may depend upon availability of funds), and transmitting 35 total "courses."

Production costs per television program can vary significantly both between and within subjects. The following cost figures should be treated as averages realizing that the cost of individual units can deviate widely from this mean. Production and transmission costs in 1971 prices per program for both television and radio are given in Table 19. Total costs are converted to 1972 and 1973 prices.

The 18 "course" production figure includes 8 revisions of existing courses as well as the 10 new "courses." Even though the actual number of courses transmitted in equilibrium varies quite significantly from the 35 assumed in Table 19, total B.B.C. costs will not vary proportionately since transmission costs are relatively small.

Table 18

Open University 1973 Course Offerings

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Faculty	Title of Course	Credit Rating
Arts	Humanities: A Foundation Course	1
Mathematics	Mathematics: A Foundation Course	1
Mathematics/Science/ Technology	Elementary Mathematics for Science & Technology	1/2
Science	Science: A Foundation Course	1
Social Sciences	Understanding Society: A Foundation Course	1
Technology	The Man-Made World: A Foundation Course	1
Arts	Renaissance and Reformation	1
	The Age of Revolutions	1
General	Science and the Rise of Technology since 1800	1/2
	Integrative Studies 1: Design Methods	1/2
Social Sciences	Decision Making in Britain	1
	New Trends in Geography	1/2
	National Income and Economic Policy	1/2
	The Sociological Perspective	1/2
	Fundamentals of Psychology	1/2
	Prices and Markets	1/2
Educational Studies	Personality Growth and Learning	1/2
	School and Society	1/2
	The Curriculum: Context, Design and Development	1/2
Mathematics	Linear Mathematics	1
	Mathematics: Continuous and Discrete	1
	An Algorithmic Approach to Computing	1/2
Mathematics/Science/ Technology	Elementary Mathematics for Science and Technology	1/2
	Mechanics and Applied Calculus	1/2

Table 18 (cont'd)

Faculty	Title of Course	Credit Rating
Mathematics/Social Science/Educational Studies	Statistics	1/2
Science	Comparative Physiology	1/3
	Geology	1/3
	An Introduction to the Chemistry of Carbon Compounds	1/3
	Structure, Bonding, and the Periodic Law	1/3
	The Earth's Resources	1/3
	Biochemistry	1/6
	Geochemistry	1/6
	Environment	1/6
	Geophysics	1/6
	Development and Genetics	1/6
Science/Social Sciences/Technology	Biological Bases of Behaviour	1/2
Science/Technology	Principles of Chemical Processes	1/2
	Solids, Liquids and Gases	1/2
Technology	Applied Mechanics	1/2
	Modelling and Control	1/2
	Systems and Systems Behaviour	1/2
Technology/Science	Electromagnetics and Electronics	1/2
	Introduction to Materials (The Solid State)	1/2

Table 19

British Broadcasting Corporation Costs

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Media	"Courses" Cost		Number of "Courses"	Total Cost		
	Production	Transmission		1971 Prices	1972 Prices	1973 Prices
	1971 Prices	1971 Prices				
Television	£64,000		18	£1,152,000		
		£1,600	35	56,000		
Radio	£25,600		18	460,800		
		£640	35	22,400		
Total				£1,691,000	£1,722,000	£1,937,000

Line 6. Miscellaneous Costs

This category includes the Institute of Educational Technology (£137,000), Operations (£459,000), Maintenance (£371,000), Staff and Student Facilities (£43,000), and a general provision of £64,000. The total for Line 6 is, in 1972 prices, £1,031,000. In 1973 prices, it is £1,160,000 (£1,031,000 x 112.5%).

Line 7. Total Fixed Costs

The summation of lines 1 through 6 yields a total fixed cost figure of £7,195,000 for 1972 in 1972 prices. The corresponding figure for 1973 prices is £8,095,000.

Variable Costs

Cost data in this section were calculated in 1971 prices and then converted to 1972 and 1973 prices.

Line 8. Correspondence Materials Costs (Including Experimental Kits)

This category includes printing correspondence materials, postage and packaging, audio-visual aids, and home experimental kits. Printing correspondence materials average £8 per "course" yielding a total figure of £336,000 (£8 x 42,000 "courses"). The £8 per "course" is based on the present mix of "courses" amongst faculties, being higher for the science and technology faculty "courses." This figure could therefore vary in the future if the distribution of student places by faculty were to alter. Postage and packaging costs, as with the printing costs, average £4 per "course" yielding a total of £168,000 (£4 x 42,000 "courses"). With larger student numbers this average cost could be reduced with the adoption of larger, lower-per-unit-cost, machines. Audio-visual aids, consisting of records, tapes, or slides, which some faculties send out with their correspondence package, is costed at £0.5 per "course" resulting in a total of £21,000 (£0.5 x 42,000 "courses"). Home experimental kits, the largest single item in the category, cost £33 per "course." This figure is derived by taking

25% of the actual cost of producing the kits (£132). Of the £33 per kit, £14 is charged for consumable items in the kit and the remaining £19 is for depreciation, lost kits, and servicing. These experimental kits, designed for use in the students' homes, are substitutes for conventional laboratory services and are used only by students in science and technology. Since the proportion of students in science and technology is 26.7% of all students, the total cost of experimental kits is £370,062 (£33 x 11,214 students). Thus the estimated total for the category in 1971 prices is £895,000 (£336,000 + £168,000 + £21,000 + £370,062). The actual costs in 1972 for a student body of 32,000 were £866,000. In 1973 prices for a student body of 38,000 the cost in this category is £1,157,000 (£86,000 x 112.5% x 118.75%).

Line 9. Tutors and Counselling Costs

As stated earlier, tutors and counsellors fall into two distinct groups, part-time and full-time. In some instances one individual may carry out both tutoring and counselling functions. Some of the tutors and counsellors have face-to-face contact with the students, some tutors only grade correspondence materials and some are in both categories, especially the full-time supervisors in each region under the regional directors.

Costs in this category in 1972 were £963,000. Using the method explained above, these costs in 1973 prices totalled £1,286,000 (£963,000 x 112.5% x 118.75%).

Line 10. Summer Schools Costs

The cost per "course" for summer school is £25 for a foundation "course" and £35 for an upper-level "course." These costs are set to make the Summer Schools a break-even proposition for the Open University; thus the whole cost is borne initially by the student, but he may be subsidized totally or in part by his local education authority. The decision to subsidize summer school is at the discretion of each local education authority. Because summer schools are an integral part of the Open University, their costs must be included. The difference in cost for

foundation versus upper-level courses reflects the economies of scale obtainable in the larger classes in the foundation courses.

In 1972, some 30% of students were exempted from attending summer schools. As a result the actual costs of these schools were reduced from the expected figure of £1,134,000 in 1971 prices (£1,348,000: i.e., £1,134,000 x 118.9% in 1973 prices) to £736,000 in 1972. Again using the same formula, this becomes £983,000 (£736,000 x 112.5% x 118.75%) in 1973 prices.

Line 11. Data Processing Costs

The areas in which data processing occurs are registration, admissions, and examinations. (Data Processing includes computer-marked assignments, but this cost is charged under Line 12, Examination Costs.)

These costs in 1972 totalled £110,000, approximately £3 per student. In 1973 prices, and with the increased student numbers, the total is £147,000 (£110,000 x 112.5% x 118.75%).

Line 12. Examination Costs

An initial examination cost was estimated at £2 per examination. On the assumption that of the 42,000 "course" enrollment 38,000 examination papers will require to be graded, total examination costs were expected to be £76,000 (£2 x 38,000).

The costs in this category have increased considerably from these original estimates. The only explanation for this fact is that the original estimates were based on a per-student cost which has since proved unrealistic. The cost in 1972 was £184,000 which, converted as above, yields a total of £246,000 (£184,000 x 112.5% x 118.75%).

Line 13. Regional Administration Costs

Since all of the costs in this category have now been attributed to the fixed costs area for the reasons already given, there is no entry in the variable costs category.

Line 14. Rental Costs

As discussed earlier the price charged to the Open University for rental of buildings for tutorials is determined either by a central or local authority in charge of each building and may vary from zero to some figure covering cost. Since there are 273 study centers open an average of three evenings per week for 36 weeks and since the total cost to the Open University for all such facilities was only £68,000 in 1972 the resulting per-tutorial cost of approximately £2 is evidence that this is an area of Open University operations being significantly subsidized by local and central government through taxation, since £2 is far below even the marginal cost of such facilities. It should be recalled that one "balancing" item is that Open University equipment can be used by the institutions housing the equipment and the Open University students. Total cost in this category, charged to the Open University for 1972, was £68,000 which becomes £91,000 (£68,000 x 112.5% x 118.75%) in 1973 prices.

Line 15. Total Variable Costs

Total variable costs are the summation of the costs for lines 8-14 and equal £2,927,000 in 1972 and £3,910,000 in 1973 prices for a student population of 38,000.

Line 16. Total Costs

Total costs for the Open University in steady-state equilibrium in 1973 are the sum of total fixed cost (£8,095,000) and total variable cost (£3,910,000) and equal £12,005,000.

CHAPTER 5

Cost Comparisons: The Open University and Conventional Universities

These costs are the raw data on which a tentative analysis of efficiency can be based; where this entails the comparison of costs with the conventional universities the figures used are derived by applying the index numbers in Table 15 to the teaching costs of the "average" and of "selected" universities.

One important assumption made in the calculation of those costs is that Open University students' opportunity costs are zero. This is obviously not the true state of affairs. However, in comparing Open University costs with conventional university costs, the same assumption will be made for conventional university students. It is frequently argued that conventional university costs should be increased to take account of the earnings foregone of full-time students, but that such a calculation should not be included for Open University students with full-time employment. If this were done, leisure time of Open University students (or second jobs) would be attributed zero value and the gap between Open University and conventional university costs would widen significantly. Since one purpose of the study is to compare costs by type of institution, all student opportunity costs will be ignored because, while it is not its main purpose, an Open University could be substituted for a conventional university.

It is now possible to consider the question of the cost of education using the Open University system compared to the cost of conventional universities. This is a question for which it is not possible to formulate a precise answer because the comparison between the two requires a definition of output, and there is more than one way of defining what is meant by the output of an educational process.

If any decisions are to be made which are based on per-student costs in the two types of university, we must be careful not to abdicate the decision-making process by choosing particular student equivalences. The real question involves determining the returns from resources allocated on an Open University student compared to allocations on a conventional student; this cannot be resolved by using arbitrary methods of "equating" the two types of students. The use of equivalents may have the unfortunate effect of providing

a seemingly plausible answer which in fact diverts attention from the crucial question of understanding the Open University output.

It may seem to be self-evident that since the Open University student is part-time and is expected to take considerably longer to complete his degree than the conventional student, some sort of adjustment should be made to take account of the fact that the Open University student is in some sense a "lesser entity" than other students. The difficulty lies in determining a relative measure of this which can be used as a weighting factor in the comparisons. Because this is difficult there is often a tendency to look for indicators of equivalence which are part of the cost structure itself; for example, it may be argued that the number of hours of teaching which a part-time student receives can be used as the basis for comparing the part-time with the full-time student. The trouble is that the number of hours of received teaching is an important component of total costs, and if an average equivalent figure is used then the observed variation in unit costs between institutions will be partly due to differences in the teaching input; as a result there is no basis for drawing efficiency conclusions from such observed differences in costs.

We are in no position at the moment to evaluate the output of a student year in the Open University compared to a student year in a conventional university; this would involve the use of an educational assessment method which at the moment can hardly be visualized in principle. But the fact that such a direct measure of output does not exist does not leave us completely in an impasse; this is because the degree which the Open University ultimately awards is at the moment generally regarded as equivalent to the degree awarded by a conventional university. If the ultimate output is regarded as homogeneous then the contribution which each element of the course makes towards this final output can also be regarded as homogeneous. The question of comparing the year which a student spends studying in the two types of university can then be expressed as follows: "What is the contribution towards the final degree of an average student year in the Open University compared to an average student year in a conventional university?" There are at least four ways of approaching this question, and each of these

provides the basis for a different calculation of equivalence between Open University and conventional university students.

The first possibility is to accept that a cost or input study such as this can say very little about outputs. The calculation would simply be to find out the cost of educating the average Open University student for a year compared to that of educating the average conventional student for a year; the reason for any differences could subsequently be discussed in the light of a number of output issues. At some point the decision has to be made on whether the returns on the money spent per student are acceptable.

A second method involves time taken to complete a degree. In the conventional university the student will on average complete his degree in three years, but in the Open University the requirement is to complete six credit courses; for the average Open University student to graduate in three years would require the completion of two courses per year, and consequently the total number of student courses taken in any one year can be divided by two to obtain the equivalent number of full-time students. It will be noted that this is a conversion of the number of courses taken to student equivalent and not the actual number of students. It can also be noted here that some Open University students do in fact take two full-credit courses in one year, but they are still essentially regarded as part-time students. But it is not entirely accurate to calculate the number of student equivalents by dividing by two; this is because the degree awarded by the Open University is equivalent not to the Honours degree which the typical student is awarded after three years but to the Scottish Ordinary or English General degree. Since the bulk of conventional students do in fact take the Honours degree, and on the basis of present evidence it would appear that most graduates of the Open University will aspire to the Honours degree, it is perhaps more appropriate to consider the contribution which two courses would make to the completion of the Honours degree. The requirement of the Open University for an Honours degree is eight course credits, the additional two being at third or fourth level, and this will add another year to the time required for the completion of the course. Thus instead of contributing one-third towards the degree, two courses in one year

contribute one-fourth, and thus the calculation of student equivalents must be weighted to account for this. The weighting of course units to be used is therefore 3/4 x 1/2 = 3/8; this number will be used in the calculations as well as the weighting of 1/2 in arriving at costs per student equivalent.

The third possibility is to adapt this approach to take account of the fact that the average student in the Open University does not have to complete six or eight courses for the degree because there is an exemption system in operation. This results in a considerable reduction in the average time required to gain an Open University degree. The time to complete the ordinary degree, assuming the student takes 1.1 courses per year and is granted 1.4 exemptions, is 4.1 years; if the pattern is the same for those who go on to Honours, the time required would be 6 years. We can here assume that the exemptions awarded by conventional universities are negligible, and that the average length of time required for a degree is three years. This means that in terms of the Ordinary degree the Open University student year is $3 \div 4.1$ that of the conventional university student year, while if the basis of comparison is the Honours degree then the equivalent is $3 \div 6$. The calculation therefore involves the actual number of students in the Open University weighted by these ratios to arrive at the full-time equivalent.

The final possibility is to calculate the cost per graduate: the rationale for the derivation of the previous methods is that the degrees awarded are homogeneous. This is, of course, an incomplete measure of output since the Open University is not merely a "degree-producing factory" and since the procedure allows no weight to be attached to the educational benefits to be gained from nongraduating students. Furthermore, the costs involved will depend on the graduation rate and at the moment the information available on this refers only to one year. At the moment a graduation rate of 27% in steady state, giving 4,000 graduates per year, seems to have general acceptance, but the calculations are also carried out for 20% and 40% graduation rates to indicate the effect which could result from different actual rates.

The cost per full-time student equivalent obtained from the application of the first three methods outlined above is set out in Table 20; the cost per graduate is set out in Table 21.

It is clear that in terms of the actual numbers of students educated the Open University is considerably less costly than the conventional system: the cost of providing education for a year in the Open University is 37% of that incurred in the "selected" university and 30% of that in the "average" university. As explained above, any judgment on the returns to the two types of student year would depend on a study of outputs. When the attempt is made to adjust the numbers of students according to the notions of equivalence it would appear that the Open University still maintains its cost advantage; the important question is by how much. The figures are particularly susceptible to whether the Open University Ordinary or Honours degree is compared with the average degree awarded by the conventional university. The assumption that the Open University Ordinary degree is equal to the average degree of the conventional university is clearly weak, and the alternative of comparing the Honours degree of the Open University indicates that the cost advantage of the Open University could be at the most 27% and may be as low as 9%.

It would appear that on the basis of Table 21 the Open University per-degree cost is not very much different from that of the conventional university on the assumption of the 27% graduation rate. If the graduation rate were to fall below this, the cost per graduate would be higher. On the other hand if the graduation rates were even to be half those of the conventional system, then there is no doubt that the costs per graduate would be relatively low.

Although these figures are striking, there are a number of issues which are not covered by this presentation. For example, the calculations of degree costs are based on an annual intake of 15,000 students and a steady-state population of 38,000; however, the Open University was originally intended to accommodate 55,000 students. It would be of interest to investigate the cost implications of increasing the Open University to this size. This is not a question to which a precise answer can be formulated given the information available at the moment, but some indication of the magnitudes

Table 20

Comparative Teaching Costs in 1973 Prices

Cost Per Full-Time Student Equivalent

Institution	Number of Full-Time Student Equivalent	Teaching Cost Per Full-Time Student Equivalent
Selected University	21,000 (full-time students)[a]	£830
Average University	21,000 (full-time students)[a]	997
Open University	37,042 (actual student number)	304
Open University	21,000 (two full-credit courses contributing to Ordinary degree: $\frac{42,000}{2}$)	566
Open University	15,750 (two full-credit courses contributing to Honours degree: $\frac{42,000}{2x3/4}$)	756
Open University	27,104 (contribution of average student year to Ordinary degree: $37,042 \times \frac{3}{4.1}$)	416
Open University	18,521 (contribution of average student year to Honours degree: $37,042 \times \frac{3}{6}$)	609

[a]See Appendix III for the calculation of teaching cost per full-time student equivalent at a "selected" and "average" university in the United Kingdom.

Table 21

Comparative Teaching Costs in 1973 Prices Cost Per Graduate

Institution	Graduation Rate	Cost Per Graduate
Selected University	87%	£2,863
Average University	87%	3,434
Open University	27%	2,972
Open University	20%	3,963
Open University	40%	1,981

involved can be obtained. If it is assumed that the additional students would have similar characteristics to the present Open University population, the required entry rate would be approximately 20,000 students per year. Since the University was designed for 55,000 students the fixed costs can be treated as largely unchanged at £8,095,000. If it is assumed that there will be no significant economies of scale, then the variable costs will increase to 55/38 x £3,910,000 = £5,659,000; the total costs would then be £13,754,000. If the graduation rate were assumed to be 27%, then the stream of graduates would be 20,000 x .27 = 5,400 in steady state, which would result in a cost per graduate of £2,547. This is considerably less than the calculated cost per graduate in the "selected" university as shown in Table 21.

This type of increase can also be analyzed using the notion of student equivalent; for the purposes of illustration the equivalence of two full-credit courses with a conventional student will be used. The 55,000 students would study 60,800 courses, implying student equivalent of 30,400. Assuming again the lack of any economies of scale, the cost of the larger Open University can be compared to those of new average and selected universities as shown in Table 22. Since the influence we are considering is the use of excess capacity in the Open University, it is to be expected that this will result in a reduction in the average student costs. But the real significance of the figures lies in the application of the marginal cost concept. The cost of teaching an additional 9,400 students in the Open University would be £1,482,000 compared to £7,847,000 in the "selected" university and £9,420,000 in the "average" university. The differences between these marginal costs are considerable, and similar differences will be found using the other methods of equating the students. This is the type of approach which can be used to help answer such questions as the optimum size of the Open University given the cost structure of the conventional university system.

Table 22

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Teaching Costs by Institution with Increased Enrollment

Institution	Student Equivalent	Teaching Costs (in £000s) Fixed	Variable	Cost Per Full-time Student Equivalent
Selected University	21,000	Zero	17,437	830
	30,400	Zero	25,284	830
Average University	21,000	Zero	20,933	997
	30,400	Zero	30,353	997
Open University	21,000	7,978	3,293	542
	30,400	7,978	4,775	423

CHAPTER 6

Changing Aspects of Resource Allocation

Because of its nature as an institution using pioneering teaching methods, the Open University was unable to draw on any great wealth of experience when it started. It therefore had to make many assumptions about how it would work in practice; these were rather tentative and could only be made final with experience. Thus after three years it has become possible and necessary to reevaluate some of the assumptions made initially and to note the lessons that have been learned in some areas of the Open University's work.

While many of the assumptions (about pass rates, course production rates, etc.) have had to be reevaluated generally for the Open University and certain financial implications have had to be taken care of, the main problem now seems to be not overall assumptions about the workings of the Open University, but the reevaluations which have had to be made for the different faculties; problems arise which necessitate a reevaluation of resource allocation between faculties within the Open University owing to different costs/student and costs/graduate as a consequence of interfaculty differences in course production costs and in student performance.

While it is now believed that course production rates are only 80% of what was expected, this average figure hides large differences among the various faculties. Table 23 shows the increases needed in academic staff in each subject area to complete their target number of courses. From this it can be seen that while the social sciences subject area has ostensibly the correct number of academic staff, all other subject areas fall short, especially science and technology (61% and 86% below requirements). In this calculation it is assumed that there are constant returns to scale (i.e., each additional staff member adds the same absolute number of course units), and also that academic staff members expend equal amounts of work-time in course production.

As was pointed out above, interfaculty course costs per student and per graduate will be affected by the number of students who continue in the course. Different pass/fail/dropout rates are significant between different foundation

Table 23

Current and Required Academic Staff

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Faculty	Present Number	Number to Achieve Targets		Additional Numbers Required	% Increase
Arts	27	33	53%	6	22
Mathematics	26	34		8	31
Educational Studies	33	36		3	9
Social Sciences	33	33		0	0
Science	36	58	47%	22	61
Technology	35	65		30	86

courses; however, evidence shows that after the foundation level these rates become almost equal between faculties.

Tables 24 and 25 demonstrate the effect of this higher failure rate in science and technology. While 15.3% and 9.9% of new undergraduates were in the science and technology courses, only 10.8% and 6.9% were doing post-foundation courses in these subject areas. Table 25 shows the distribution by faculty of continuing students who are studying postfoundation-level courses as of July 1973.

Ordinary and Honours Degrees in the Open University

As stated earlier, the Open University offers both Ordinary and Honours degrees. To obtain the Honours degree, the student who has obtained the Ordinary degree must take two additional "courses" which must be at third or fourth level. Therefore the requirement for the award of the Open University B.A. with Honours is the passing of two foundation-level, four second-level and two third- or fourth-level courses.

It is not known how many ordinary Open University graduates will decide to take the Honours courses. The only information available concerns the Open University graduates of 1972 who cannot be taken as typical because they were granted the maximum number of exemptions, and they averaged 1.5 courses per year. Of the 872 students graduating, 716 have reregistered. Of this number 47 were potential Honours graduates in 1973. In the conventional university, approximately 80% of graduates are awarded an Honours degree and 20% a pass or Ordinary degree. If it is assumed that the same percentages opt for the Honours courses in the Open University then 3,200 students will graduate with Honours each year when the equilibrium position has been reached. While this number may appear unrealistically high, it provides a useful upper limit for course numbers and a lower limit for per-student, per-course costs.

Using the upper-limit assumption described above and the present distribution of students by faculty, it is possible to estimate the additional cost of the Open University Honours degree by faculty, given that each faculty, with the exception of science, will provide four "courses" at third and

Table 24

Number and Percentage Distribution of New Undergraduate Students by Course

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Faculty	Number	%	
Arts	3,635	27.0	
Mathematics	1,822	13.6	72.6% Non-Science
Social Sciences	4,296	32.0	
M.S.T.	292	2.2	
Science	2,057	15.3	27.4% Science & Technology
Technology	1,337	9.9	
Total	13,439	100.0	

Table 25

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Number and Percentage of Continuing Students by Faculty

Faculty	Number	%	
Arts	7,093	19.5	82.3% Non-Science
Mathematics	4,941	13.6	
Educational Studies	12,781	35.1	
Social Sciences	5,122	14.1	
Science	3,948	10.8	17.7% Science & Technology
Technology	2,514	6.9	
Total	36,399	100.0	

fourth level for its honours students. The science faculty, because it is subdivided into chemistry, physics, etc., will be presumed to require eight "courses." Each "course" will be granted a life expectancy of 10 years, and 50% of the original "course" cost will be required for revision.

It is assumed that each "course" will consist of 32 correspondence units, 16 television and 32 radio programs. Each "course" therefore contains 32 "units."[11] The base for the faculty norms is the experience of the Open University over the last three years which has provided the productivity norms per faculty member employed in the calculations. These are shown in Table 26.

Using the information in Table 26 it is a simple matter to calculate the number of faculty needed to produce one "course" in each faculty. That number and the basis for the calculation is shown in Table 27. Academic faculty costs[12] are shown in Table 28 and are in 1973 prices. Combining the data in Tables 27 and 28 provides a faculty cost per "course" in each of the six faculties of the Open University. Table 29 details this information. In addition to the faculty costs shown in Table 29 three other components of course-production costs must be calculated. They are:

(1) Broadcasting Costs

The total expenditure on broadcasting in 1972 was £1,722,000. Assuming a 10% price increase 1972-1973 would give £1,894,200 in 1973 prices. With 20 "courses" broadcast, the per-course cost would be £94,710. In view of the very large discrepancies between U.K. and U.S. costs in this area, it is not considered a useful exercise to try to be more precise. In fact, the

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[11] The "unit" will be used in future calculations and will be taken to be $\frac{1}{32}$ part of a 1-credit course.

[12] These costs are obtained by abstracting from the Open University Statement of Accounts for 1972 the individual costs of each faculty. (The costs are not only faculty salaries; they include consumables, travel, secretarial, and consultants.) The total cost for each faculty is divided by the number of faculty members to provide an average cost per academic faculty member. This figure is increased by 8.0% to bring the 1972 costs to 1973 prices as per Table 15.

Table 26[a]

Productivity Norms

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Faculty	Units Per Faculty Member Per Year
Arts	3.5
Social Sciences	3.2
Education	3.3
Mathematics	2.0
Science	1.8
Technology	1.6

[a]The figures are obtained by dividing the number of "units" produced in each faculty by the number of academic faculty members.

Table 27

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Number of Academic Staff to Produce 1 Course (32 Units)

Faculty	Academic Staff Required	
Arts	9	(32 ÷ 3.5)
Social Sciences	10	(32 ÷ 3.2)
Education	10	(32 ÷ 3.3)
Mathematics	16	(32 ÷ 2.0)
Science	18	(32 ÷ 1.8)
Technology	20	(32 ÷ 1.6)

Table 28

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Faculty	Number of Academic Staff	Total Cost (¥)	÷	Number of Faculty	Average Cost Per Academic Faculty Member (¥)
Arts	27	151,865	÷	27	5,625
Social Sciences	33	175,812	÷	33	5,328
Education	33	157,821	÷	33	4,782
Mathematics	26	185,665	÷	26	7,141
Science	36	271,538	÷	36	7,543
Technology	35	218,446	÷	35	6,241

Table 29

Cost Per Faculty Per "Course" (1973 Prices)

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Faculty	Academic Staff Required for 1 "Course"	Average Cost Per Faculty Member (£)	Total Faculty Cost Per "Course" (£)
Arts	9	5,625	50,625
Social Sciences	10	5,328	53,280
Education	10	4,782	47,820
Mathematics	16	7,141	114,256
Science	18	7,543	135,774
Technology	20	6,241	124,820

£94,710 figure is within 5% of the cost calculated by Pratten[13] when allowance has been made for inflation.

(2) Accommodation Costs

Each faculty member requires 15 square meters accommodation office or laboratory space. Such accommodation costs from £100 to £110 per square meter.[14] The mean cost of £105 will be used. The capital cost per faculty member is, therefore, £1,575 (£105 x 15). Accommodation costs per faculty are shown in Table 30.

(3) Other Area Costs

Each faculty is charged for the services it receives from other areas of the Open University, in particular from the media and publishing sectors. The costs to be borne by the faculty are shown in the faculty budgets.[15] Table 31 provides total "other area" costs in 1972. Column 2 shows the number of "courses" produced per faculty, column 3 the cost per "course" for each faculty, and column 4 updates column 3 to 1973 prices. Total costs by faculty which can be found by amalgamating the costs in Tables 29, 30, and 31 and the broadcasting costs are shown in Table 32.

Table 33 provides the costs by faculty of one "course." To find the total costs by faculty of the number of courses required to sustain the population of Honours students, one must use the assumptions previously made on the number of courses. They provide per-faculty costs. The costs by faculty of producing the Honours courses having been calculated, it is necessary to estimate the number of students, by faculty, who will be studying them.

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[13] A. E. Pratten, The economics of television. (London: PEP, 1970.)

[14] The annual cost figures, shown in the last column of Table G in Appendix II, are obtained by assuming a 10% interest rate and a 1 1/2% depreciation rate. Annual cost in the Arts faculty, for example, is £1,630 [£14,175 x 11 1/2% (10% interest + 1 1/2% depreciation)].

[15] Open University Statement of Accounts, 1972.

Table 30

Accommodation Costs Per "Course" by Faculty[a]

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Faculty	Academic Staff Required for 1 "Course"	Cost Per Faculty Member(£)	Total Cost (£)	Annual Cost (£)
Arts	9	1,575	14,175	1,630
Social Sciences	10	1,575	15,750	1,811
Education	10	1,575	15,750	1,811
Mathematics	16	1,575	25,200	2,898
Science	18	1,575	28,350	3,260
Technology	20	1,575	31,500	3,623

[a]Source: The University Grants Committee Index of Building Costs 1973.

Table 31

"Other Area" Costs[a]

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Faculty	Total "Other Area" Costs (£)	Number of Courses Produced[b]	Cost Per Course 1972	1973 Prices (x 112.5%)
	1.	2.	3.	4.
Arts	25,930	3.0	8,643	9,723
Social Sciences	21,752	3.3	6,592	7,416
Education	22,428	3.4	6,596	7,421
Mathematics	12,376	1.6	7,735	8,702
Science	31,202	2.0	15,601	17,551
Technology	23,305	1.8	12,947	14,565

[a]Source: University Grants Committee Index (Table 6).

[b]The figures in this column are found by multiplying the number of faculty members (Table 2) by their productivity norms (Table 26) and dividing by 32; i.e., number of units in 1 course, e.g., Arts (27 x 3.5) ÷ 32.

Table 32

Course Production Costs by Faculty

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Faculty	Faculty Costs (£)	Broadcasting Costs (£)	Accommodation Costs (£)	"Other Area" Costs (£)	Total Costs (£)
Arts	50,625	94,710	1,630	9,723	156,688
Social Sciences	53,280	94,710	1,811	7,416	157,217
Education	47,820	94,710	1,811	7,421	151,762
Mathematics	114,256	94,710	2,898	8,702	220,566
Science	135,774	94,710	3,260	17,551	251,295
Technology	124,820	94,710	3,623	14,565	237,718

Table 33

Costs of Honours Courses by Faculty

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Faculty	Number of Courses	Initial Costs Per Course (£)	Revision Costs Per Course (£)	Total Costs Per Course (£) (Col. 2 + 3)	Total Costs (Col. 4 x 1) (£)
	1.	2.	3.	4.	5.
Arts	4	156,688	78,344	235,032	940,128
Social Sciences	4	157,217	78,609	235,826	943,304
Education	4	151,762	75,881	227,643	910,572
Mathematics	4	220,566	110,283	330,849	1,323,396
Science	8	251,295	125,648	376,943	3,015,544
Technology	4	237,718	118,859	356,577	1,426,308

Table 34 shows number of "courses" and percentage of total courses by faculty. This faculty percentage will be used to estimate the number and percentage of student population by faculty.

The 4,000 ordinary graduate total will be used to estimate costs by faculty. Of this total, 80% is assumed to be the annual Open University Honours graduate output of the university; this percentage was chosen because it is the same as that produced by the conventional university system. Also, the only source of information on the Open University potential Honours graduates is that taken from the first graduating class. Of 872 students graduating in 1972, 716 have registered with the Open University for 1973. This represents an 82% Honours rate. While the point has already been made that this set of students is not typical of the Open University population, it may set the standard for future years. Applying the 80% figure will provide an Honours population of 3,200 students on an annual basis. In 10 years, the lifetime of the "courses," a total population of 32,000 graduates (3,200 x 10) may be expected to use these "courses." To determine the per-student, per-course cost, the data from Table 7 will be used to estimate the number of students in each faculty. Total "course" costs for each faculty will then be divided by that number of students. Table 35 describes numbers and percentages of students by faculty over the 10-year period. The per-student, per-course costs in each faculty can now be calculated. This is done in Table 36.

In calculating the marginal costs of the Open University Honours graduate by faculty, two sets of assumptions will be made, and therefore two sets of cost figures will be calculated.

Assumption 1: It is assumed that the annual population of Honours graduates is contained within the total Open University population number of 38,000. In this case, the marginal costs by faculty are those set out in Table 37. The totals in column 3 must be added to the per-degree costs calculated previously and repeated in column 4 to provide the costs of the Open University Honours degree by faculty.

Assumption 2: It is assumed that the annual population of Honours graduates is additional to the total Open University population of 38,000.

Table 34

Number of Student Courses by Faculty

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Faculty	3rd-Year Student Courses	Continuing Student Courses	Total Student Courses (Column 1 + 2)	% of Total Courses
	1.	2.	3.	4.
Arts	3,635	8,050	11,685	26.8%
Social Sciences	4,296	5,654	9,950	22.8%
Education	--	6,593	6,593	15.1%
Mathematics	1,968	4,622	6,590	15.1%
Science	2,057	2,895	4,952	11.4%
Technology	1,337	2,565	3,902	8.9%
Total			43,672	100.1%

Table 35

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Percentage and Number of Potential Students by Faculty

Faculty	Number	Percentage
Arts	8,576	26.8%
Social Sciences	7,296	22.8%
Education	4,832	15.1%
Mathematics	4,832	15.1%
Science	3,648	11.4%
Technology	2,848	8.9%
Total	32,032	100.1%

Table 36

Per Student Costs by Faculty

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Faculty	Total Cost (£)	Student Number	Per Student Cost (£)
Arts	940,128	8,576	110
Social Sciences	943,304	7,296	129
Education	910,572	4,832	188
Mathematics	1,323,396	4,832	274
Science	3,015,544	3,648	827
Technology	1,426,308	2,848	501

Table 37

Honours Degree Costs by Faculty

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Faculty	Per Student Per Course (£)	Number of Additional Courses Per Honours Student	Marginal Cost Per Honours Student (£)	Average Cost Per Ordinary Degree (£)	Cost by Faculty Per Honours Degree (£)
	1.	2.	3.	4.	(3 + 4) 5.
Arts	110	2	220	2,972	3,192
Social Sciences	129	2	258	2,972	3,230
Education	188	2	376	2,972	3,348
Mathematics	274	2	548	2,972	3,520

In this case, the marginal costs shown in column 3 of Table 37 must be increased by £206 per student. (The total variable costs figure of £3,910,000 divided by 38,000 provides an annual variable per-student cost of £103. This is multiplied by 2 since two courses will be taken by each Honours student.) Table 38 includes this additional average variable cost figure and uses the data from columns 1 and 2 of Table 37.

The cost data in column 5 of Table 37 and in column 4 of Table 38 do not provide an exact picture of the relative Honours degree costs by faculty because they are based on an addition to the Ordinary degree costs which are obtained by an averaging procedure. The problem of disaggregating these costs (students may take courses from more than one faculty) has already been mentioned. However, it is clear that since most "science" students will have a preponderance of "science" courses in their degrees, and since the per-course costs in the "science" faculties are higher than in the "non-science" faculties, disaggregated Ordinary degree costs would reflect this difference. Also, since there are fewer students in the "science" faculties, per-student costs will be greater. For these reasons, the figure of £2,972 shown in Tables 37 and 38 should be increased for "science" and reduced for "non-science" graduates, but by how much is not known. There is insufficient information at this time to be more precise.

Due to the tentative nature of many of the assumptions and the lack of data on the Open University's production of Honours graduates, it was not thought worthwhile to continue the analysis, on the assumption that the Open University was allowed to reach its initial target of 55,000 enrolled. While the marginal cost of producing Honours graduates would fall as the numbers admitted rise, conclusions about interfaculty costs of Honours graduates would be entirely speculative.

Two observations can be made about our calculations of Honours degree costs in the Open University system. First, there are large interfaculty differences in the cost of producing an Honours graduate; and second, in some faculties the marginal cost of producing an Honours graduate is extremely high. Recent evidence suggests that the Open University has already experienced these cost differences and is attempting to overcome them.

Table 38

Honours Degree Costs by Faculty

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Faculty	2-Course Cost Per Honours Student (£)	Additional Average Cost Per Honours Student (£)	Average Cost Per Ordinary Degree (£)	Cost by Faculty Per Honours Degree (£)
	1.	2.	3.	4. (1+2+3)
Arts	220	206	2,972	3,398
Social Sciences	258	206	2,972	3,436
Education	376	206	2,972	3,554
Mathematics	548	206	2,972	3,726
Science	1,654	206	2,972	4,832
Technology	1,002	206	2,972	4,180

The calculations which have been made were based on two assumptions, one made explicit and the other implicit in our analysis. First it was considered that third- and fourth-level courses would be needed in the following numbers for each faculty to allow the student to choose his subject areas and also allow the Honours degree to contain the requisite number of specialized third- and fourth-level courses.

Faculty	No. of Courses
Arts	4
Social Science	4
Education	4
Mathematics	4
Science	8
Technology	4

The second assumption, which was implicit in our analysis, was that the third and fourth level would be presented to the students using the same general method as used for foundations and second-level courses, i.e., 32 correspondence units, 16 television, and 32 radio programs.

Both of these premises seem to have been revised in the most recent academic plans of the Open University.

The latest figures which we have give the following as the number of third- and fourth-level courses which will be available in 1975.

Faculty	No. of Courses
Arts	6
Social Science	4 1/2
Education	2
Mathematics	1 1/2
Technology	1 1/2
Science	1 1/2

This revision of the Open University's academic plan has important implications. First, the interfaculty differences in cost for the production

of Honours degrees will be reduced, and second, the Open University will not be able to offer a specialized Honours degree in 1975. Students will have to choose their third- and fourth-level courses from different faculties.

Some idea of the cost implications of this change can be given if, using the same method as used previously, we assume (a) that the revised figures for third- and fourth-level courses in 1975 represent an equilibrium situation in the Open University's academic planning and (b) the operational assumption that students in each faculty can do two third- or fourth-level courses, although we know from the figures given that in some faculties this will be impossible. Tables 39, 40, and 41 summarize these figures.

The second assumption which was made in the calculation of the costs of Honours degrees--that the same techniques would be used in the presentation of third- and fourth-level courses as is used in the presentation of foundation and second-level courses--is also beginning to be questioned.

It is now being suggested that alternative methods of instruction might be used. This is an attempt to reduce the per-student costs of presenting courses to a very small number of students, by substituting a cheaper medium such as textbooks and lecture notes for television and radio programs.

It is not possible at this stage to estimate the difference this might make in the marginal costs of producing Honours graduates except to say that it should bring them down. However, if it is found that only in certain faculties is it possible to change the technology of instruction, then inter-faculty cost differences may again pose a problem.

In comparisons of conventional universities with open learning systems, it is often argued that substantial cost savings could be effected within the conventional university structure, if reorganization within conventional institutions occurred and if new technology were introduced;[16] such a

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[16]For example, it has been estimated that potential economies of scale exist in the University of Bradford in England and that a doubling of the student body size could reduce average costs per student between 10 percent and 30 percent. (Bottomley et al., Cost effectiveness in higher education. Paris: OECD, 1971.)

Table 39

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Costs of Honours Courses by Faculty

Faculty	Number of Courses	Total Cost per Course (see Table 33)	Total Costs
Arts	6.0	235,032	1,410,192
Social Science	4.5	235,826	1,061,217
Education	2.0	227,643	455,286
Mathematics	1.5	330,849	496,273
Science	1.5	376,943	565,414
Technology	1.5	356,577	534,865

Table 40

Per-Student Costs by Faculty

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Faculty	Total Cost (£)	Student Number	Per-Student Cost (£)
Arts	940,128	8,578	164
Social Science	943,304	7,296	145
Education	910,572	4,382	94
Mathematics	1,323,396	4,832	103
Science	3,015,544	3,648	155
Technology	1,426,308	2,848	188

Table 41

Honours Degree Costs by Faculty

BEST COPY AVAILABLE

Faculty	2 Course Cost Per Honours Student	Additional Average Cost Per Honours Student	Average Cost Per Ordinary Degree	Cost by Faculty Per Honours Degree
Arts	328	206	2,972	3,506
Social Science	290	206	2,972	3,408
Education	188	206	2,972	3,366
Mathematics	206	206	2,972	3,384
Science	310	206	2,972	3,488
Technology	376	206	2,972	3,554

statement might also be applicable within the Open University system, though perhaps to a lesser degree.

It should also be noted that the Open University system relies heavily on past investments in both human and nonhuman capital in terms of the availability of part-time tutors and counsellors, in existing telecommunication networks and in buildings and facilities, the main function of which is to serve conventional students but which are used when vacant by Open University staff and students at very low marginal costs.

While the emphasis in this report has focused on the costs of undergraduate teaching in the Open University using its existing factor input mix and producing a set number of courses, it is more than just a useful exercise to postulate alternatives and cost them out since other nations might wish to use the form of the Open University but with different specifications depending upon these countries' needs and factor input prices. Two areas which will be discussed briefly are alternative Open University output and different factor input mixes to produce the same output.

Alternative Open University Output

As has been mentioned already the Open University will produce a limited number of postexperience courses. In the planning stages of the Open University many people argued that the greatest benefit of an Open University might indeed stem from such courses which were variously described as "updating," "refresher," "conversion," or "retraining" courses. Courses of this kind provide either for people to keep up to date with developments in their own specialized field of work in a time of accelerating technological change, or for teaching people a new skill for a new occupation because that very technological change has made their former specialty obsolete. It is true that in the United Kingdom, as in most developed countries, there is no shortage of the postexperience type of course, but since many employers are unwilling or unable to grant leave-of-absence for full-time study to their employees, the advantage of the Open University system lies in the fact that individuals can continue full-time employment and take these courses in their leisure time.

While the Open University intends in the future to produce a wide range of postexperience courses, thus bringing the university to the people rather than bringing the people to the university, it was felt that the Open University's name had to be firmly established and academic creditability gained through its undergraduate program before launching into the post-experience field.

The development of any type of course involves substantial resources, and the Open University faces a cash-flow problem in the postexperience field even if, as is intended, the course fees cover the entire cost of producing and operating the course since a one- to two-year time lag exists between the beginning of course development and the collection of fees.

Because of stringent government control of financing, the Open University may have to seek outside funding from those industries, to which benefits will accrue from Open University postexperience courses, for the development of such courses.

Enrollment of Eighteen-Year-Olds

One interesting development, forced on the Open University by the government, which was not the original intention of the Open University planners involves the admission of eighteen-year-olds and constitutes another Open University output. The Open University was not set up to compete with conventional universities for students and, to this end, no one under the age of twenty-one years was eligible for enrollment. The lack of entrance qualifications essentially made the Open University the university of a "second chance." In 1974, 571 eighteen-year-olds will be enrolled, 376 of whom will not meet conventional university entrance requirements. The remaining 195 would have been eligible to attend a conventional university had they so chosen. The Open University emphasizes the fact that this is an experimental venture which has two main purposes. The first is to determine the suitability of the Open University system with its nontraditional teaching format for students just out of high school who may lack the maturity and self-discipline, in comparison with the normal Open University intake, to complete an Open University degree. The second is to find out

whether some of the Open University courses could be substituted for courses currently taught to full-time students in other institutions of higher learning. In many such institutions specializing in one field, e.g., engineering, considerable resources must be devoted to providing their specialist students with at least an introduction to liberal studies. Were the Open University courses substitutable, economies of scale could be realized by having these courses taught by the Open University and resources freed within these specialist institutions. This additional market for those courses would also provide the Open University with needed extra finances.

Changes in the Mix of Open University Factor Inputs

The Open University experiment has been watched closely not only for its impact on adult student education but also for the cost implications of its adopted method of tuition. These cost implications have been discussed above. This section will explore the cost implications, based on the experience of the Open University, of alternative models of tuition.

The Open University uses a combination of methods, the mix varying between different courses and levels of study. At this point it might be useful to repeat them briefly.

Correspondence Material--Prepared by staff members and linked to particular set books.

Assessment and Assignment Material--Objective and tutor-marked tests to enable both the student and the University to evaluate the student's understanding of the material.

Broadcasting--Television and radio programs linked to correspondence material.

Home Experimental Kits--Used by science and technology students to enable experiments to be undertaken at home.

Audio-Visual Aids--Records, tapes, photographs or slides used by certain courses as teaching material.

Personal Tuition--Weekly, fortnightly, or monthly sessions with tutor and counsellor. These are less frequent at postfoundation-level courses.

Summer Schools or Day Schools--Week, weekend, or day of tuition. Compulsory foundation-level tuition of one week's continuous duration; weekend or day tuition is more likely to be used for postfoundation-level courses.

From the data already analyzed, one can trace the broad implications of different factor input mixes. A more detailed study of the cost implications of three alternatives is provided below. The alternatives are:

1. To delete correspondence tuition, substituting this with a far larger broadcasting component which would become the main element of tuition, supplemented by the existing personal tuition services.

2. To delete broadcasting, using the resources for a larger element of personal tuition and maintaining the present correspondence element.

3. To substitute radio for television broadcasting, using the resources released for a greater element of personal tuition.

The analysis assumes all other factors in the Open University system remain the same, i.e., 10 hours per week of study per full-time course equivalent, 37 equivalent full-credit courses over 6 faculties with an average of 10 new courses per year.

Alternative 1--Delete correspondence tuition and replace by broadcasts.[17]

Practical considerations rule out this alternative for part-time students in the United Kingdom. The constraint with part-time students is that broadcasting can only take place in the early morning (0600 to 0800), evening (1800 to midnight) and weekends (0900 to midnight). This provides a total transmission time of 70 hours. With 37 courses this allows less than 2 hours per course per week; and, if broadcasting is to become the main tuition component, then allowance will have to be made for broadcasts to be repeated.

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[17] Costs in this section are calculated in 1971 prices.

This would mean less than 1 hour of television and 1 hour of radio per week per course which are probably insufficient to meet the educational objectives of this alternative.

In the United States, however, it may be feasible to use this alternative for full-time students so that daytime transmission can be used. It may therefore be useful to give some broad indication of the cost alternatives.

Assuming 10 hours total study per course per week, some 5 hours might be devoted to broadcasting made up of 2 hours television and 3 hours radio. The cost implications show wide variations according to the assumptions made about broadcasting costs. The data given, however, allow the cost implications of alternative assumptions about broadcasting mix to be calculated.

Television costs average £8,000 per hour. There may be some economies of scale with longer programs, but more television time is likely to involve more programs of the same length, rather than longer programs. More programs may also produce economies of scale through the shift use of television studios. Assuming constant returns to scale, the television production costs of a unit of two hours' television will be £16,000, amounting to a full 32-unit cost of £512,000. With 10 new full-credit courses, as at present, this gives a total television production cost of £5,120,000.

Transmission costs are more difficult to calculate. The cost of £100 per half hour is the marginal use of the existing B.B.C.-2 transmitter. The transmitting costs given by Pratten[18] for the operating costs of a new station seem more appropriate, as the system is likely to require 148 hours of transmission per week (37 courses x 2 hours x 2 hours for repeats). This produces transmission costs of £2 million if 80 percent of the population is covered, and this is the figure budgeted.

Radio production costs amount to £2,000 per hour. Therefore, a 32-week course of 3 hours per week produces radio costs of £192,000, which for 10 new courses amounts to £1,920,000 per annum.

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[18] Cf., A. E. Pratten, The economics of television. (London: PEP, 1970.) P. 36.

Transmission costs are approximately £50 per hour. Thus for 3 hours per week for 32 weeks for 37 courses the total cost is £177,600.

The overall costs of 2 hours television and 3 hours radio per week for 37 courses for 32 weeks amount to £9.2 m (television production £5.0 m + television transmission £2.0 + radio production £2.0 + radio transmission £0.2).

Total broadcasting costs will be about £9 million compared to £1.70 million at present.

Savings will occur in correspondence services, publishing, and media and amount in total to about £250,000. However, a larger number of programs will require more video and audio tapes for study centers. Assuming constant costs this could amount to an extra cost of nearly £1 million. Therefore, there is a net cost to other areas of the University of about £750,000.

The total increase in fixed costs would come to about £8 million.

Direct student cost. Having no correspondence material saves printing costs of just over £400,000 for 38,000 students. Postage, home experimental kits, tuition, and counselling would still be required, so an average reduction of only about £11 per student might be expected.

It is clear from the above figures why the original concept of the University of the Air in the United Kingdom was abandoned. There are practical difficulties in providing enough air time for a large number of courses and the overall effect of substituting 2 hours television and 3 hours radio for the present correspondence material is likely to double the cost per student.

Alternative 2--Delete broadcasting and use the resources to provide a larger element of personal tuition maintaining the present level of correspondence tuition.

As a result of abolishing broadcasting some £1.7 million would be saved. How much extra tuition will this buy and what are the cost implications of changing student numbers? The problem in this comparison is that broadcasting costs are fixed, whereas tuition costs vary with student numbers.

Part-time tuition and counselling costs average less than £30 per student course. Thus if the £1.7 million saved by deleting broadcasting were spread

over the 42,000 "courses" part-time tuition could be more than doubled and, if economies of scale exist, it might be possible to triple this activity.

It should be emphasized that no assumption is being made about what form the extra tuition might take. It could take the form of more tutor-marked assignments, more evening tutorials, day or weekend tutorials, or summer schools. By adopting this alternative, however, the Open University would not differ significantly from many of the existing institutions which provide a mix of correspondence and personal tuition services. In addition, the innovative nature of the Open University in harnessing the media of television and radio for educational purposes would be lost.

Alternative 3--To substitute radio for television, allowing the resources released to be used for a greater element of personal tuition.

Total broadcasting costs will amount to approximately £1.7 m in 1973. Of this, television costs are approximately £1.4 m and radio £0.3 m. If radio programs were to be substituted on a one-to-one basis for Open University television programs instead of having 300 television productions, 1,300 television transmissions, 300 radio productions and 1,250 radio transmissions, the Open University could produce 600 radio programs and 2,500 radio transmissions.

If constant costs are assumed in radio production and transmission, there will be a saving of £1.4 m from television and an additional cost of £0.3 m for the extra radio programs producing a net saving of £1.1 m. At an approximate cost of £30 per student this would enable tutorial provision to be doubled for 38,000 students.

As with alternative 2, appeal and potential effectiveness of carefully prepared televised lectures would be lost.

CHAPTER 7

Conclusion

What does emerge from this research is that the Open University using existing technologies has sound comparative cost reasons for its existence; its comparative benefits will only be realized in the fullness of time when data become available. Additional research on the operation of a potential United States Open University might well concentrate on the application of new technologies to the model outlined above. For example, the potential of computer-assisted instruction has barely been tapped and the possibility of satellite communications systems for educational purposes remains virtually unexplored. While many conventional universities currently employ, albeit to a limited extent, video and audio cassettes, closed circuit television, programmed instruction, games, and cases, the high equipment costs and limited enrollments in any one institution inhibit all but the largest institutions from utilizing these techniques. Because of the size of the Open University student body, it may be cost effective for the Open University to develop materials using new technologies even if the market were limited to its own students. The fact that a potential market for such materials may well exist outside an Open University is no guarantee that any one smaller institution will be willing and able to undertake both the costs and risks of production and distribution. Each institution tends to be concerned with local, not global, educational efficiency. The latter may only be achieved by the introduction of an institution whose scale dictates that it employ these new technologies to achieve internal efficiency and which achieves global efficiency as a by-product through small institutions which make use of those materials but bear only their marginal costs. Thus, the potential impact of an Open University is twofold; it may well provide a public good to other institutions in the form of lower cost materials made possible by exploiting economies of scale and will also increase the educational options and opportunities for individuals seeking higher education.

The Impact of the Open University on Existing Institutions

An Open University in the U.S. can be expected to affect both the demand and supply functions of other institutions of higher learning. If, as is assumed for the U.K. Open University, the degree awarded by the U.S. Open University is to be equivalent to that of conventional universities, there would undoubtedly be some students of conventional universities and colleges who would prefer the Open University format since it would enable them to obtain a degree without having to give up full-time employment. This choice would be available not only to new students, but also, assuming credits could be transferred, to students currently attending conventional institutions and to graduates who want a post-graduate degree on a part-time basis. At present the determinants of demand in this area are not known.

Another source of Open University students consists of those trade, business, or technical institutions which do not provide degrees, whose students might thus be attracted to an Open University offering a much wider variety of courses (as well as a possible degree) than currently are offered at separate institutions. A third major category consists of students who, disillusioned by their experience in conventional higher education, drop out, and, in seeking a second chance, find many conventional doors closed to them.

A fourth group of potential Open University students underrepresented in higher educational institutions, consists of racial minorities. A detailed analysis of California higher education[19] indicates the marked degree of underrepresentation of minorities in higher education. Four principal reasons for this state of affairs are: (1) the severe high school dropout rates of many minorities; (2) the lack of encouragement, counselling, and guidance; (3) the relatively high costs to the poorest sections of the community in terms of income foregone in participating in full-time education; (4) the lack of educational institutions in poor areas. An Open University, with appropriate tutoring and counselling, can overcome many of these disadvantages which the community and junior colleges cannot. While it is

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[19] Government Committee on Higher Education, California Legislature, The challenge of achievement, p. 66. (1969, unpublished)

true that the British experience does not hold very much promise that a significant number of applicants for an Open University-type of education will emerge from this group, it is also true that no incentives of the kind that are available to minority students in the U.S. exist in the U.K. The demand in this area is not, at present, being met by the existing institutions and its extent is likely to remain unknown until an Open University or similar university is actually established.

The third largest occupational group, after teachers and individuals in the professions and the arts, applying for admission to the U.K. Open University consisted of housewives (9% of the total). Were a similar pattern to emerge in the U.S., the Open University would make available educational opportunities to women unable to pursue higher education along conventional lines because of employment and/or family commitments. Since it has been found that the educational attainment of the mother has a major impact on the learning of the children, the benefits of an Open University educational system would be magnified.

A sixth important category, already discussed in the British setting, consists of individuals seeking postexperience courses either to enhance their employment potential or to open up fields of study for consumption purposes. The recent upsurge of interest in the U.S. for adult education programs is evidence that the demand is not confined only to degree-level courses. Not only might individuals personally seek this postexperience education, but firms might also wish to provide opportunities for their employees to take Open University courses, were the real costs to the firms sufficiently modest; i.e., employees need not travel to take extended courses and, with a sufficiently large audience, the price for the course should be less than for corresponding courses in existing institutions.

While it is relatively easy to identify groups which might benefit from the establishment of a United States Open University, it is extremely difficult to estimate the potential demand with any degree of precision. The British experience is not particularly helpful, partly because the British estimates of potential Open University enrollment varied between 35,000 and 184,000--and these estimates were obtained by carrying out a survey--but also because, even if the estimates had been much less divergent, the

U.S. and U.K. systems of education are in no way compatible; i.e., the "open" system of the U.S. cannot be compared with the "closed" system of the U.K. The relative benefits which the two systems confer on their societies is a question for the comparative educationist; in this section, attention will be confined to the merits of the U.S. educational hierarchy with particular emphasis on the lower strata, the two- and four-year colleges, and the potential impact of a U.S. Open University in this area.

In the discussion of future educational needs, two facts are apparent. The first is that by the end of this decade, the college and university population of the U.S. will number between 12,000,000 and 14,000,000, representing an approximate increase of 50% in a relatively short time span. The second, if present trends are indicative of future events, is that an even larger proportion of these future students will fail to graduate and will drop out for many reasons, not the least of which is that their perceived educational needs will not be satisfied within the existing educational environment. While nationally the variety of courses now being offered is much greater today than at any time in the past, there is no guarantee that the student attending the local institution of higher learning will be able to choose courses which fit his particular needs and desires. Instead of choice, the student often finds himself confronted with a standardized freshman curriculum containing many required courses which have little immediate relevance to his educational wants.

The high dropout rate, shown in Table 42, cannot be explained solely by the absence of student choice in courses. Another important contributing factor is undoubtedly quality of instruction. In this area, junior and community colleges face two problems: the first is to find faculty members who, on paper, have the required teaching qualifications, given the low prestige value of teaching jobs within these colleges and the absence of significant research opportunities in these institutions. Unfortunately, many of the poorer quality graduates who eventually find employment in this area, step up the course content to a level they faced when in graduate school. This also tends to heighten the despair of the student. The second major problem is the inability of these institutions to keep their better teachers in the classroom, since to recognize their

Table 42

Dropout Rates for Colleges and Universities[a]

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Type of Institution	% of Students Graduating within 4 yrs. at Initial Institution	% of Students Graduating within 10 yrs. at Some Institution	1st-time, Full-time Enrollments, Fall 1969	% of All 1st-time, Full-time Enrolled
15 Most Selective Private Institutions	80-85	90-95	20,000	1
Large State Universities	35-45	60-70	239,000	15
State Colleges	15-25	35-50	322,000	21
Public Junior Colleges	20-25	15-30	457,000	29

[a]F. Newman, et al. Report on Higher Education. (Washington, D. C.: U. S. Government Printing Office), 1971. The table demonstrates how graduation rates and hence dropout rates vary according to the type of institution. All categories have not been computed.

value as teachers is to promote them to administrative positions or to lose them to higher ranks in similar institutions or to those schools carrying greater prestige. In addition, the externalities which exist in large faculties within university departments are absent in the small colleges and this leads not only to more dissatisfaction on the part of these semi-isolated individuals, but also detracts from their teaching potential because of the lack of intradisciplinary contact.

To meet all local educational needs, a college or university offering a wide variety of high-quality courses would have to be established in every urban community. Given the financial constraints at present operating and likely to continue into the foreseeable future, such a solution is not only highly improbable but also does not take advantage of the technological innovations discussed above.

An Open University with high-quality faculty preparing the widest possible variety of carefully produced courses, adopting the media of television, radio, and a national computer system, and using tuition and counselling services, might well prove to be a viable alternative. This would be true especially for those racial and ethnic groups who have been deprived of such services in the traditional programs and whose total environment minimizes the probability of their receiving the parental and school tutoring and counselling which is an intrinsic part of white middle-class students' lives.

The research above has indicated that substantial cost savings could result were an Open University adopted in the U.S., but the total impact of such a system may well yield benefits far in excess of those obtainable under the 55,000-student model which has been discussed. The U.S. Open University will, however, require both the vision and courage of educational planners, especially in the face of the massive inertia or worse of the entrenched self-interest groups in higher education; it will similarly require a substantial resource commitment to promote that scale of institution necessary to achieve economic efficiency and educational effectiveness.

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APPENDIX I

Course Offerings

The Foundation Courses

The following foundation courses were offered in 1971 and in 1972.

a. Arts Faculty. Humanities: A Foundation Course. The purpose of the foundation course in humanities is to provide the student with an overview of those disciplines traditionally taught individualistically; i.e., history, literature, philosophy, art, and music. During the first four weeks of the course, which are spent in familiarizing the student with terminology and basic concepts, no written assignments are given. After this initial introduction and for the next twelve weeks the separate disciplines are introduced and written assignments given. These assignments are graded by the same tutor to provide continuity in student contact; it is felt that this continuity is more important to the student than potential gains which the student could realize from his exposure to specialist tutors in each discipline.

After these sixteen weeks the following twelve weeks are taken up with case studies. In 1971 the case studies were these:

(i) Which was Socrates?
(ii) What is a Gospel?
(iii) The Lives of the Painters, by Vasari.
(iv) Hamlet.
(v) Descartes: The Father of Modern Philosophy.
(vi) Mendelssohn's Rediscovery of Bach.

Each case is of two weeks' duration and each involves a written assignment by the student, again marked by the same tutor.

The last eight weeks of this 36-week course also make use of the case-study method, and in 1971 there was one case concerned with the industrialization of British society in the mid-19th century. As with the short cases, written assignments were given.

b. Social Science Faculty. Understanding Society: A Foundation Course. As the title implies the foundation course in Understanding Society is concerned

with those disciplines which help explain man as a social animal. The course adopts an interdisciplinary approach initially, followed by separate treatment of topics by five major disciplines--economics, sociology, psychology, political science, and geography. The topics are:

(i) Why do people live in societies?
(ii) How do people live in societies?
(iii) What kinds of problems do people face?

The last topic covered in this course is "the population explosion" and again this topic is treated in an interdisciplinary fashion.

This course is a prerequisite for more advanced study in the social sciences but is also designed to introduce the social scientist to the methodological rigor of the natural scientist as well as to give the natural scientist an awareness of social problems. The topical outline of the course is as follows:

(i) Why people live in societies
  (a) fundamental aspects of human behavior
  (b) what individuals gain from government
  (c) societies and environments
  (d) economic cooperation
  (e) the interrelationships that form society

(ii) How people live in societies
  (a) the effect of socialization
    1. child socialization
    2. personality development
    3. the family and its function
    4. attitudes and prejudice
  (b) economy and society
    1. economic wants
    2. the process of production
    3. markets and prices
    4. sociology of economics behavior
  (c) money wealth and class
    1. the working of the economy
    2. money
    3. distribution of incomes
    4. social stratification
    5. the psychology of social class

(d) spatial aspects of society
    1. habitat and economy in contrasted societies
    2. differential rural land-use patterns
    3. zoning with cities
    4. size, complexity, and spacing of towns
    5. politico-geographic models
(e) government and politics
    1. formal structure of government
    2. governmental processes
    3. political cultures
    4. governmental functions in stateless societies
    5. politics in social groups
(f) stability, change, and conflict
    1. the individual and his groups
    2. the stability of society
    3. change and conflict in society

(iii) What kinds of problems people face in societies--an interdisciplinary analysis of the current "population explosion."

c. Mathematics Faculty. Mathematics: A Foundation Course. While it is true that there are no formal entrance qualifications for any of the foundation courses, students in both the mathematics and the science foundation courses are implicitly required to have achieved a basic mastery of the subject (up to four years of high school mathematics, for example). For students who have not reached the level of proficiency, or who have some doubt about how much they have retained from school, sets of self-tests and refresher booklets are available which essentially give "crash courses" in the elementary principles of the various branches of mathematics. This service is provided free to all students who apply.

A costly alternative which could make allowances for the lack of homogeneity in students' mathematics backgrounds would involve offering a variety of programs to reach the desired common base.

As with all the foundation courses, the length of the mathematics course is 36 weeks, and also, as with the other courses, an integrated approach within the subject is stressed with particular emphasis placed on the relationships among different branches of the subject, i.e., algebra, trigonometry, geometry, calculus, etc.

The basic purpose of the mathematics foundation course is not to teach tools and techniques but rather to give students an awareness of the nature of mathematical thought, the mathematical approach and the fundamental

mathematical concepts necessary to help solve applied problems. Indeed traditional mathematics and routine exercises are conspicuous by their absence.

The course also includes an introduction to the computer and computer programming. Approximately 40 percent of the study centers throughout the country have at least one teletype terminal connected to one of two central computers at Walton Hall, or at Newcastle. Once again students are encouraged to meet regularly with their tutors and are required to attend the one-week summer school.

d. Science Faculty. Science: A Foundation Course. In the science foundation course, as in the mathematics, the problem of different student backgrounds in the subject arose but was solved in this case by introducing supplementary introductory materials with the regular correspondence material.

Again the course was 36 weeks in duration, and again the approach was interdisciplinary. The science foundation course presents the subjects of biology, physics, chemistry, and earth sciences examined in their interdependent functions. The course purports to teach the relationships among the different branches of science, technology, and human society.

In 1973 two additional foundation courses will be offered. They are "The Man-Made World," a one-credit unit course and "Elementary Mathematics for Science and Technology," a one-half-credit unit course; the latter may not be taken in conjunction with the mathematics foundation course because it contains elements from the full course.

e. Technology Faculty. The Man-Made World: A Foundation Course. This new technology course has no explicit prerequisites. The course is concerned with the application of the findings of research and development to human welfare. It ranges over the spectrum of technological advance in pure science, applied science, and the social sciences. The approach is one of model building with emphasis on the advantages and limitations of models. It involves operations and systems analysis and provides not only the necessary techniques but also the opportunity for students to apply these techniques to real-world problems. The computer facilities will also be used in this course.

f. Joint Faculties of Mathematics, Science and Technology. Elementary Mathematics for Science and Technology: A Foundation Course. This one-half-

credit unit course is a shortened version of the mathematics foundation course described above. Its main purpose is to provide students who do not elect to take the full-year course in mathematics with the necessary mathematical skills for more advanced courses in science and technology. The main elements of the course are calculus, complex numbers, computer programming, differential equations, linear algebra, numerical methods, probability and statistics. Table I-A summarizes the foundation course offerings for the years 1971-73.

Second-Level Courses

Some second-level courses have no prerequisites while others require students to complete foundation courses or possess exemptions. Table I-B lists the courses available in 1972 or planned for 1973. To add greater flexibility to students' choices of subjects, students may elect to combine fractional course-credit units to sum to not less than one-half-credit unit; i.e., a student may not register for a one-third- or one-sixth-credit unit alone. It was felt that such flexibility would be of considerable benefit to students in mathematics and science since many of these students would be able to satisfy some parts of the course requirements but not all.

Third- and Fourth-Level Courses

In 1973 and thereafter third- and fourth-level courses will be offered, designed primarily for students taking the B.A. degree with honors. At this time the exact offerings for 1974 are unknown but a selection of courses from those listed in Table I-C will be offered. Credit unit ratings are not yet available for the courses listed.

Postgraduate Offerings

In 1972 the Open University offered a limited number of places for postgraduate study. Potential degrees to be awarded are B.Phil., M.Phil., and Ph.D. Two types of postgraduate students will emerge; the first will be based on the actual campus at Milton Keynes and will be a full-time student. The second would normally be a graduate with employment experience who would work to obtain an advanced degree on a part-time basis.

Table I-A

Foundation Course Offerings

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Field of Study	Courses			Credit Unit Rating
	1971	1972	1973	
Arts	Humanities	Humanities	Humanities	1
Mathematics	Mathematics	Mathematics	Mathematics	1
Mathematics/ Science/ Technology	n.a.	n.a.	Elementary Mathematics for Science and Technology	1/2
Science	Science	Science	Science	1
Social Science	Understanding Society	Understanding Society	Understanding Society	1
Technology	n.a.	n.a.	The Man-Made World	1

Table I-B

Second-Level Courses[a]

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Line of Study	Title of Course	Credit Rating
Arts	Renaissance and Reformation	1
	The age of revolutions	1
General	Science and the rise of technology since 1800	1/2
	Integrative studies 1: Design methods	1/2
Social Sciences	Decision making in Britain	1
	New trends in geography	1/2
	National income and economic policy	1/2
	The sociological perspective	1/2
	Fundamentals of psychology	1/2
	Prices and markets	1/2
Educational Studies	Personality growth and learning	1/2
	School and society	1/2
	The curriculum: Context, design, and development	1/2
Mathematics	Linear mathematics	1
	Mathematics: Continuous and discrete	1
	An algorithmic approach to computing	1/2
Mathematics/Science/ Technology	Elementary mathematics for science and technology	1/2
	Mechanics and applied calculus	1/2
Mathematics/Social Sciences/ Educational Studies	Statistics	1/2
Science	Comparative physiology	1/3
	Geology	1/3
	An introduction to the chemistry of carbon compounds	1/3
	Structure, bonding, and the periodic law	1/3
	The Earth's resources	1/3
	Biochemistry	1/6
	Geochemistry	1/6
	Environment	1/6
	Geophysics	1/6
	Development and genetics	1/6

Table I-B (cont'd)

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Line of Study	Title of Course	Credit Rating
Science/Social Sciences/ Technology	Biological bases of behaviour	1/2
Science/Technology	Principles of chemical processes	1/2
	Solids, liquids, and gases	1/2
Technology	Applied mechanics	1/2
	Modelling and control	1/2
	Systems and systems behaviour	1/2
Technology/Science	Electromagnetics and electronics	1/2
	Introduction to materials (the solid state)	1/2

[a]Guide for Applicants for Undergraduate Courses 1973. The Open University, p. 21.

Table I-C

Third- and Fourth-Level Courses[a]

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These proposals are subject to alteration, but give an idea of the probable range of courses which will be offered in 1973 or subsequent years.

Arts	War and society The novel Problems of philosophy Art and design in the 19th and 20th centuries Studies in instrumental music		Mathematics	Mathematics Computer science Statistics Mathematics and its applications Courses on special topics in mathematics	
Educational Studies	Education, economics, and polity Language and associated cognitive development Evaluation and assessment Administration and management	2nd or 3rd level courses	Social Sciences	Comparative government People and organizations Urban development Theory and research in sociology Economic growth, development and planning Communication A study of a selected geographic area Research methods in the social sciences Ideology and society	2nd or 3rd level courses
Science	Biology, physiology of cells and organisms; ecology; biochemistry and molecular biology; evolutionary biology. Geology: endogenetic processes and products; exogenetic processes and products. Chemistry: structure and mechanism in chemistry-organic and inorganic; principles of chemical processes; selected topics in chemistry. Physics: quantum theory and atomic physics; solid state physics; electromagnetism; statistical mechanics.		Inter-Faculty Courses	Design Applied psychology Quantitative economics Business economics Philosophy of the social sciences History of scientific thought and discovery Physical and technical optics Technophysics Mathematical physics	

[a] Ibid., pp. 22-23.

Normal entrance requirements will include an Honours degree from a British University or, in keeping with the philosophy of the Open University, evidence that the applicant possesses the intellectual capacity and ability to attain the necessary research standards. Applicants may be examined or assessed in some other way prior to registration. Initially all such students will be registered under the general heading "postgraduate student" rather than as a candidate for one of the three specific degrees. After one year of postgraduate studies when more information on the student will be available, the university will determine whether the candidate is suitable for the higher ranking of the postgraduate degrees or whether registration should be cancelled. Resident students will be supervised by a full-time staff member (or members) of the Open University, but external students will be supervised jointly by Open University staff and by an external supervisor, preferably located within reasonably close proximity to the student.

Formal courses will not be available to postgraduate students in the foreseeable future because of the priorities, dictated by the government, given to the undergraduate degree. However, credits will be awarded on research output evaluated by the Open University staff supervisor. Table I-D summarizes credit-unit requirements by degree. One unit of credit may be given for the equivalent of three months' full-time research (one year part-time). For the M.Phil. or Ph.D. a thesis or dissertation must be presented within three years of fulfilling the credit requirements. Table I-E summarizes the fees payable for each degree. Potential postgraduate students, while encouraged to pursue research in fields of research of interest to the Open University staff, will not be precluded from submitting other research topics. A postgraduate student, again consistent with the Open University philosophy, may elect to undertake interdisciplinary research projects for his degree. (Table I-F)

Starting in January 1973 the Open University, in accordance with its original program, will provide postexperience courses, which will be certificated but which will not lead towards any degree. These courses will be designed for persons seeking to extend their knowledge within their present occupational concerns and also for persons wishing to acquire knowledge in fields new to them. For such courses there are no formal entrance requirements, though because of the fact that they are postexperience, some background

Table I-D

Credit Unit Requirements for Postgraduate Degrees[a]

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Degree	Credit Units
B. Phil.	3
M. Phil.	6
Ph.D	9

[a]Holders of advanced degrees from other British universities may have the required number of credit units reduced by one unit in the degree of M. Phil. and Ph.D. Such a reduction requires approval of the senate of the Open University.

Table I-E

Postgraduate Degree Fees

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Degree	Registration Fee	Credit Fee	Examination Fee	Total
B. Phil.	$37.50	(3 x $62.50) $187.50	$50.00	$275.00
M. Phil.	$37.50	(6 x $62.50) $375.00	$87.50	$500.00
Ph.D.	$37.50	(9 x $62.50) $562.50	$125.00	$725.00

Table I-F

Postgraduate Students Registered During the Academic Year Ending December 1972[a]

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	Full-Time	Part-Time (Internal)[b]	Part-Time (External)	Total
Arts-based[c]	6	8	54	78
Science-based[d]	19	12	24	55
Total	25	30	78	133

[a]Source: Open University Planning Office Statistical Bulletin, April/May 1973, TABLE 2D.

[b]Members of the University's full-time staff.

[c]Arts-based: Students registered with the Faculties of Arts, Educational Studies, Social Sciences, and the Institute of Educational Technology.

[d]Science-based: Students registered with the faculties of Mathematics, Science, and Technology.

knowledge will be assumed. The typical course will be no longer than one year. These courses will employ the same format as the undergraduate courses using radio, television, correspondence material, evening and weekend tutorials, summer schools, computers, etc.

The first five courses will be:

(i) Biological Bases of Behavior

(ii) Computing and Computers

(iii) Electromagnetics and Electronics

(iv) Reading Development

(v) Reformation Studies

Table I-G details the duration and cost to the student of each course.

These costs are estimated to cover total cost of the courses and will vary according to the expected useful life of each course plus student demand. They are significantly higher than the prices charged to undergraduates for their courses which are subsidized to a considerable extent by the government. A total of 2100 students were studying postexperience courses in July 1973.

Table I-G

Postexperience Courses: Duration and Cost

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Course	Duration	Per Student Cost
Biological Basis of Behavior	January-November (full-year course)	$200
Computing and Computers	March-November	$175
Electromagnetics and Electronics	January-November	$200
Reading Development	March-November	$125
Reformation Studies	May-September	$75

APPENDIX II

Student Characteristics and Demand for the Open University

The Open University Planning Committee estimated from the Robbins Report that at least one million British adults (21-50) could benefit from a university education and that 10 percent of this number might be expected to take advantage of the Open University opportunity.

Another large group of potential students was composed of individuals who had taken higher education courses which did not lead towards a degree. This includes, for example, 250,000 school teachers.

It was estimated that of the approximately 100,000 students who annually apply for first-year conventional university places, 30,000, while holding adequate entrance requirements, will not be admitted through unavailability of places. If they have not been able to secure a place in a conventional university before they reach the age of 21 (minimum age requirement for the Open University) they might well seek entrance to the Open University.

Another source of potential demand lies in the annual 40,000 high school students, with a future university capability, who drop out of school at age 15 or 16 before they are eligible to take university entrance examinations. There were so many unknown factors in attempting to estimate the demand for the Open University that the range of possible student numbers emerging from a survey commissioned by the Planning Committee of the Open University was between 35,000 and 184,000. After some attempt to estimate demand it was decided, because of the many constraints the new Open University faced, that places would be offered to 25,000 students in the first year of operation, 1971. Dependent upon the attrition rate, a similar but adjustable annual intake for the following two to three years would be determined to achieve a maximum student body of 55,000 students.

The Open University received 130,000 inquiries and by the closing application date, August 1970, nearly 43,000 students had applied for admission. Of the 43,000 applicants, 24,344 were admitted and 24,191 actually enrolled. The admits paid a $25 initial tuition fee and were informed that while courses would begin in January the remainder of the tuition fee of $37.50 per undergraduate course would not be due until April. This was to allow students to decide whether they wished to continue at the Open University at minimal

cost to the student and also to allow the University its only opportunity to discourage unsuitable students from continuing. The University based this decision on the students' written reports and assessments by the class tutors. Of the 43,000 applying students almost one-half wished to take two courses. In the case of the 24,191 acceptances, it was decided to limit the number of students taking two courses to 20%; the number of courses actually taken was 28,723. The reasons for such a policy were twofold; first, insufficient Open University resources existed and, second, it was felt that the 20 hours or more per week of studying that two courses necessitated was beyond what could reasonably be expected from the majority of the students.

The students were admitted on a first-come, first-served basis subject to the following constraints. Initially only United Kingdom residents would be admitted and while no upper age limit was imposed, as already mentioned, students under the age of 21 would not be considered.

Three additional constraints were concerned with achieving

(i) a balanced geographical mix

(ii) a balanced subject mix

(iii) a balanced occupational mix.

Within the 25,000 student quota and a maximum of 30,000 course quota targets, quotas were established for each of the three principal constraints after the applications had been analyzed. Table IIA gives details on student applications and provisional allocation of places by region.

As can be seen from Table II-A, the aim of a balanced geographical mix, weighted by population, was achieved. It should be noted, however, that the proportion of individuals qualifying for admission to conventional universities is not randomly distributed by geographic area, after adjustment is made for population density. This is due to many factors, most of which are highly correlated with income. Generally, with a few exceptions such as the industrial Midlands and the extreme Southeast and Southwest of England, the further north the lower per capita income. The Open University's policy of admitting students, taking into account the two other major constraints, according to regional population density, in no way attempts to correct the existing imbalance. Table II-B details Open University students by subject application, quota, and admissions.

Table II-A

Distribution of Students by Region[a]

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Region	APPLICANTS				PROVISIONAL ALLOCATION OF PLACES		
	Number	Percentage of total	Estimate of percentage of pop. in region	Quota set after scrutiny of application	Percentage allocated places	Absolute number allocated places	Actual number admitted
01 London	7,571	18.5	17.9	18.2	18.0	4,503	4,217
02 South	4,621	11.3	8.9	10.1	11.3	2,813	2,693
03 South West	2,332	5.7	6.1	5.9	5.6	1,411	1,453
04 West Midlands	3,452	8.5	9.2	8.9	9.0	2,238	2,193
05 East Midlands	2,699	6.6	7.0	6.8	7.1	1,765	1,629
06 East Anglia	3,497	8.6	7.8	8.4	9.1	2,282	2,182
07 Yorkshire	3,112	7.6	8.5	8.0	7.8	1,957	1,927
08 North West	4,337	10.6	12.1	11.3	11.5	2,873	2,662
09 North	2,080	5.1	5.5	5.3	5.4	1,356	1,328
10 Wales	1,801	4.4	4.9	4.6	3.6	892	1,067
11 Scotland	3,787	9.3	9.4	9.3	9.0	2,262	2,151
12 Northern Ireland	1,528	3.7	2.7	3.2	2.6	648	842
	40,817	99.9	100.0	100.0	100.0	25,000	24,344

[a]Early development of the Open University, p. 78. Care must be taken to distinguish the number of courses from the number of students in Tables II-B through II-I.

Table II-B

Distribution of Students by Courses[a]

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Course	Number of Applicants	%	Target Quotas	%	Number of Admissions	%
Arts	16,939	27.3	8,000	26.7	7,561	26.2
Social Sciences	21,564	34.7	8,000	26.7	7,731	26.8
Mathematics	12,039	19.4	7,000	23.3	6,885	23.9
Science	11,605	18.7	7,000	23.3	6,673	23.1
Total	62,147	100.1	30,000	100.0	28,850	100.0

[a]For figures for Table II-B see Early Development, p. 76.

The rising proportion of students applying for social science places in conventional universities in Britain in the 1960s is reflected in the distribution of Open University applications. This is due in considerable part to the increasing emphasis in British high schools on the social sciences, which came about through attempts to broaden high school curricula. It should also be noted, however, that there are no explicit course requirements for social science courses in the Open University. Reasons for the Open University's failure to offer courses in accordance with revealed student preferences are complex; the fact that staffing and course development decisions had to be made prior to receiving student applications, and that externalities and economies of scale are present within large faculties suggested the faculty sizes which were then created and which in turn determined the distribution of students by faculty.

Details of student distribution by occupation are contained in Tables II-C and II-I.

As has been stated, one of the aims of the Open University was to give an opportunity for university study to anyone interested, and part of Harold Wilson's philosophy of egalitarianism included not only an equalizing of incomes but also an equalizing of higher educational opportunities. However, the hoped for high interest on the part of blue-collar workers in the Open University, for example, did not materialize in the initial applications.

As can be seen from Table II-C, however, admissions were approximately in proportion to the applications received. This, of course, is almost identical to the quota targets set after scrutiny of the applications.

Tables II-D, E, and F essentially repeat Tables II-A, B, and C with the corresponding data for the years 1972 and 1973. The salient points emerging from a comparison of the 1971, 1972, and where the differences are substantive, the 1973 figures, are:

a. A reduction in the number of individuals applying from 40,817 to 34,222 to 32,046.

b. No significant changes in the geographical mix.

c. By course allocation, large reductions in the number of students enrolled in Arts (7,561 to 6,160 to 5,000), in mathematics (6,885 to 4,510 to 2,900) and in Science (6,673 to 4,400 to 3,340).

Table II-C

Distribution of Students by Occupation[a]

BEST COPY AVAILABLE

APPLICANTS (Numbers in brackets show graduates included in preceding figure)						
Occupational Group	Number of Applicants	Percentage of total	Quota percentage set after scrutiny of applicants	Percentage allocated places	Quota percentages as absolute numbers	Number admitted
1 Housewives	3,758	8.9 (0.3)	10.0 (0.1)	9.6 (0.2)	2,500 (25)	2,484
2 Armed Forces	699	1.7	2.0 (0.1	2.0	500 (25)	497
3 Administrators and Managers	2,830	6.6 (0.3)	4.5 (0.1)	5.4 (0.2)	1,125 (25)	1,118
4 Teachers	14,642	33.6 (2.3)	30.0 (1.0)	33.0 (1.3)	7,500 (250)	7,453
5 Professions and the Art	4,869	11.3 (0.6)	8.5 (0.1)	9.7 (0.3)	2,125 (25)	2,111
6 Qualified Scientists and Engineers	3,275	7.3 (0.7)	8.0 (0.1)	9.0 (0.3)	2,000 (25)	1,987
7 Draughtsmen, laboratory assistants and technicians	3,037	7.4 (0.1)	9.0 (0.1)	9.1 (0.1)	2,250 (25)	2,235
8 Electrical, electronic, metal and machines and allied trades	730	1.8	3.0 (0.0)	2.3	750 (0)	745
9 Other manufacturing, farming, mining, construction, transport and communications	1,171	2.8	5.0 (0.1)	3.1	1,250 (25)	1,242
10 Clerical and office staff	3,324	8.1 (0.1)	10.0 (0.1)	8.0 (0.1)	2,500 (25)	2,484
11 Shopkeepers, sales, services and sport, recreation workers, Fire Brigade and Police	1,409	3.4	4.5 (0.1)	3.7	1,125 (25)	1,118
12 Not working (other than housewives), retired, independent means	1,040	2.4 (0.1)	3.0 (0.1)	2.4 (0.1)	750 (25)	746
13 In institutions	33	0.1	0.5 (0.0)	0.1	125 (0)	124
	40,817	95.4 (4.5)	98.0 (2.0)	97.4 (2.6)	24,500 (500)	24,344

[a] Early Development, p. 79.

Table II-D

Distribution of Students by Courses 1971, 1972 and 1973[a]

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FOUNDATION COURSE	APPLICANTS 1971 Number	%	1972 Number	%	1973 Number	%	ALLOCATION 1971 Number	%	1972 Number	%	1973 Number	%
Arts	16939	27.3	12356	29.1	11584	31.6	8000	26.7	6160	24.9	5000	24.7
Mathematics	12039	19.4	6310	14.9	4094	11.1	7000	23.3	4510	18.2	2900	14.1
Science	11605	18.7	5468	12.9	4115	11.2	7000	23.3	4400	17.8	3340	16.3
Social Sciences	21564	34.7	13967	32.9	12236	33.4	8000	26.7	7480	30.2	6000	29.4
Technology	-	-	4332	10.2	3387	9.2	-	-	2200	8.9	3210	11.3
M.S.T.	-	-	-	-	2166	3.5	-	-	-	-	880	4.3
Totals	62,147	100.1	42,442	100.0	36,682	100.1	30,000	100.0	24,750	100.0	20,430	100.1

[a]Analysis of Applications and Allocation of Places for 1972 Courses, Open University, 1972, p. 4. Analysis of Applications and Allocation of Places for 1973 Courses, Open University, 1973.

Table II-E

Distribution of Students by Courses 1971 and 1972[a]

BEST COPY AVAILABLE

REGIONAL ANALYSIS

Region, with estimated U.K. adult population percentage		Applicants						Allocations		
		1971 %	1972 Total Number	1972 Men	1972 Women %	1972 Total %	Target Quota % Set	1971 %	1972 %	1972 Number
London	17.9	18.5	7445	63.1	36.9	21.8	19.8	18.0	19.8	4175
South	8.9	11.3	4247	65.5	34.6	12.4	10.6	11.3	10.6	2224
South West	6.1	5.7	1816	68.1	31.9	5.3	5.9	5.6	5.7	1239
West Midlands	9.2	8.5	2756	70.7	29.3	8.1	8.7	9.0	8.6	1833
East Midlands	7.0	6.6	2053	69.3	30.7	6.0	6.5	7.1	6.5	1375
East Anglia	7.8	8.6	2883	66.6	33.3	8.4	8.1	9.1	8.1	1714
Yorkshire	8.5	7.6	2360	69.2	30.8	6.9	7.5	7.8	7.7	1590
North West	12.1	10.6	3737	69.5	30.5	10.9	11.3	11.5	11.5	2388
Northern	5.5	5.1	1619	71.2	28.8	4.7	5.2	5.4	5.1	1097
Wales	4.9	4.4	1305	69.8	30.2	3.8	4.5	3.6	4.4	945
Scotland	9.4	9.3	2906	64.8	35.2	8.5	8.9	9.0	9.0	1882
Northern Ireland	2.7	3.7	1095	71.8	28.2	3.2	2.9	2.6	3.0	603
Totals		99.9	34,222			100.0	99.0	100.0	100.0	21,065

[a] Early Development, p.5.

Table II-F

Distribution of Students by Occupation 1971 and 1972[a]

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Code	Occupation Group	Applicants 1971 %	Applicants 1971 Total Number	Applicants 1971 Men %	Applicants 1972 Women %	Applicants 1972 Total %	Target Quota % Set	Allocations 1971 %	Allocations 1972 %	Allocations 1972 Number
01.	Housewives	9.2	3763	0.1	10.9	11	11.0	9.8	10.8	2270
02.	Armed Forces	1.7	577	1.6	0.0	1.6	1.7	2.0	1.9	397
03.	Administrators and Managers	6.9	1572	4.3	0.3	4.6	4.6	5.6	4.7	999
04.	Teachers and Lecturers	35.9	10327	19.8	10.4	30.2	30.2	34.3	29.9	6306
05.	The Professions and the Arts	11.9	4283	8.0	4.6	12.6	12.6	10.0	12.5	2630
06.	Qualified Scientists and Engineers	8.0	1486	4.3	0.1	4.4	4.4	9.3	4.8	1009
07.	Technical Personnel including Data Processing, Draughtsmen and Technicians	7.5	4084	11.1	0.8	11.9	11.9	9.2	12.1	2555
08.	Electrical, electronic, metal and machines, engineering and allied trades	1.8	1017	3.0	0.0	3.0	3.1	2.3	3.2	681
09.	Farming, mining, construction and other manufacturing		772	2.2	0.1	2.3	2.3		2.3	491
10.	Communications and Transport air, sea, road and rail	2.8	476	1.2	0.1	1.3	1.3	3.1	1.3	280
11.	Clerical and Office Staff	8.2	3224	5.3	4.1	9.4	9.4	8.1	9.7	1881
12.	Shopkeepers, sales, services, sport and recreation workers, fire brigade and police	3.4	1514	3.8	0.6	4.4	4.4	3.7	4.2	895
13.	Retired, independent means, not working (other than housewives) students	2.5	1066	2.2	0.9	3.1	3.1	2.5	3.0	647
14.	In institutions, e.g., prison, chronic sick, etc.	0.1	61	0.1	0.0	0.1	0.2	0.1	0.1	24

[a] Early Development, p. 6.

Part of the reason for the decreases in Mathematics and Science can be attributed to the introduction of the new technology foundation course which drew 4,332 applicants in 1972 and 3,387 in 1973 and which was allocated 2,?00 and 2,310 students respectively. The number of Social Science allocations increased slightly from 1971 and 1972 (7,480 to 7,731), and fell in 1973 (to 6,000). The total of all foundation course allocations was reduced from 28,850 to 24,750 to 20,430. This was due to a cut-back in budgeted funds for 1972-1973 made by the newly elected Conservative Government, essentially forcing a reduction in the intended 1973 total student body from 55,000 to between 36,000 and 42,000. (See Table II-G.)

d. By occupational mix, significant changes occurred in applications for, and allocation of, student places.

The most important of these, in terms of the Open University's aim of extending higher educational opportunities, is to be found in the reduction of the numbers of applications from occupation groups 02 through 06 (white-collar workers) from 26,315 (64.5% of total applications) in 1971 to 18,245 (53.3% of total applications) in 1972 and an increase in the numbers from occupation groups 07 through 12 (blue-collar workers) from 9,671 (23.7% of total applications) in 1971 to 11,087 (32.4% of total applications) in 1972. On the admits side, total numbers allocated places from occupation groups 02 through 06 fell from 13,166 (61.2% of total admits) in 1971 to 11,341 (53.8% of total admits) in 1972. In occupation groups 07 through 12 (blue-collar workers) total admits also fell from 7,824 in 1971 to 6,783 in 1972, but their share of total admits rose from 26.4% in 1971 to 32.8% in 1972. Little further change in relative numbers occurred in 1973. (See Table II-I.)

As noted above, given no further change in governmental policy, the Open University had planned a steady-state undergraduate student body of between 36,000 and 42,000 with a probable figure of 37,500. In fact, the number of students "live" in the University in May 1973 was 38,200. This figure can be compared with the approximately 200,000 undergraduates in the 44 conventional universities, the 28,500 enrolled for a degree awarded by the Council for National Academic Awards (CNAA), and the 19,200 students enrolled for the external degrees of the University of London.

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Table II-G

Comparison of Applicants and Admits by Course (Total Numbers and Percentages) 1971, 1972 and 1973

Foundation Course	Applicants						Admits					
	1971.		1972.		1973.		1971.		1972.		1973.	
	Total Number of Courses	Total % of Courses	Total Number of Courses	Total % of Courses	Total Number of Courses	Total % of Courses	Total Number of Courses	Total % of Courses	Total Number of Courses	Total % of Courses	Total Number of Courses	Total % of Courses
Arts	16,939	27.3	12,356	29.1	11,584	31.6	7,561	26.2	6,160	24.9	5,000	24.7
Mathematics	12,039	19.4	6,310	14.9	4,094	11.2	6,885	23.9	4,510	18.2	2,900	14.1
Science	11,605	18.7	5,468	12.9	4,115	11.2	6,673	23.1	4,400	17.8	3,340	16.3
Soc. Sciences	12,564	34.7	13,976	32.9	12,236	33.4	7,731	26.8	7,480	30.2	6,000	29.4
Technology	N.A.	-	4,332	10.2	3,387	9.2	N.A.	-	2,200	8.9	2,310	11.3
M.S.T.	N.A.	-	N.A.	-	1,266	3.5	N.A.	-	N.A.	-	880	4.3
Totals	62,147	100.1	42,442	100.0	36,682	100.0	28,850	100.0	24,750	100.0	20,430	100.1

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Table II-H

Comparisons of Applicants and Admits by Region 1971 and 1972

Region With Estimated U. K. Adult Population Percentage		Applicants 1971 Total Number	Applicants 1971 Total %	Applicants 1972 Total Number	Applicants 1972 Total %	Admits 1971 Total Number	Admits 1971 Total %	Admits 1972 Total Number	Admits 1972 Total %
London	17.9	7,571	18.5	7,445	21.8	4,217	18.0	4,175	19.8
South	8.9	4,621	11.3	4,247	12.4	2,693	11.3	2,224	10.6
Southwest	6.1	2,332	5.7	1,816	5.3	1,453	5.6	1,239	5.7
West Midlands	9.2	3,452	8.5	2,756	8.1	2,193	9.0	1,833	8.6
East Midlands	7.0	2,699	6.6	2,053	6.0	1,629	7.1	1,375	6.5
East Anglia	7.0	3,497	8.6	2,883	8.4	2,182	9.1	1,714	8.1
Yorkshire	8.5	3,112	7.6	2,360	6.9	1,927	7.8	1,590	7.7
Northwest	12.1	4,337	10.6	3,737	10.9	2,662	11.5	2,388	11.5
Northern	5.5	2,080	5.1	1,619	4.7	1,328	5.4	1,097	5.1
Wales	4.9	1,801	4.4	1,305	3.8	1,067	3.6	945	4.4
Scotland	9.4	3,787	9.3	2,906	8.5	2,151	9.0	1,882	9.0
Northern Ireland	2.7	1,528	3.7	1,095	3.2	842	2.6	603	3.0
Totals		40,817	99.9	34,222	100.0	24,344	100.0	21,065	100.0

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Table II-I

Comparison of Applicants and Admits by Occupation 1971 and 1972

Code	Occupation Group	Applicants				Admits			
		1971		1972		1971		1972	
		Total Number	Total %	Total Number	Total %	Total Number	Total %	Total Number	Total %
01.	Housewives	3,758	9.2	3,763	11.0	2,484	9.8	2,270	10.8
02.	Armed Forces	699	1.7	577	1.6	497	2.0	397	1.9
03.	Administrators and Managers	2,830	6.9	1,572	4.6	1,118	5.6	999	4.7
04.	Teachers and Lecturers	14,642	35.9	10,237	30.2	7,453	34.3	6,306	29.9
05.	The Professions and the Arts	4,869	11.9	4,283	12.6	2,111	10.0	2,630	12.5
06.	Qualified Scientists and Engineers	3,275	8.0	1,486	4.4	1,987	9.3	1,009	4.8
07.	Technical Personnel including Data Processing, Draughtsmen and Technicians	3,037	7.5	4,084	11.9	2,235	9.2	2,555	12.1
08.	Electrical, electronic, metal and machines, engineering and allied trades	730	1.8	1,0[illegible]	3.0	745	2.3	681	3.2
09.	Farming, mining, construction and other manufacturing	1,171	2.8	772	2.3	1,242	3.1	491	2.3
10.	Communications and Transport air, sea, road and rail			476	1.3			280	1.3
11.	Clerical and Office Staff	3,324	8.2	3,224	9.4	2,484	8.1	1,881	9.7
12.	Shopkeepers, sales, services, sport and recreation workers, fire brigade and police	1,409	3.4	1,514	4.4	1,118	3.7	895	4.2
13.	Retired, independent means, not working (other than housewives) students	1,040	2.5	1,066	3.1	746	2.5	647	3.0
14.	In institutions, e.g., prison, chronic sick, etc.	33	0.1	61	0.1	124	0.1	24	0.1
	Totals	40,817	99.9	34,222	99.9	24,344	100.0	21,065	100.5

APPENDIX III

Cost Calculations for Conventional Universities in the U.K.

Table III-A summarizes cost calculations for the "conventional universities."

Line 1. Capital Costs

In conventional universities capital costs per student place have been estimated[20] in 1971 prices at

(i) £1850 in Arts

(ii) £ 3700 in Science and Medicine

(iii) £ 5397 in Technology.

The proportions of incoming 1971 students to conventional universities are 47% Arts, 37% Science and Medicine, and 16% Technology. Thus the capital cost per "average" student place (using the above weights) is £3102 (£1850 x .47 + £3700 x .37 + £5397 x .16) which yields a total capital cost of £65,143,449 (£3,102 x 21,000) for 21,000 students (i.e., the equivalent of 42,000 "courses," the Open University base used previously). Assuming a depreciation rate of 1 1/2 percent and an interest rate of 10% per annum, annual capital cost for the "average" university is therefore £7,491,497 (£65,143,449 x 11.5%). If 65% of such costs are allocated to teaching output the estimate for total annual capital costs becomes £4,869,000 (£7,491,497 x 65%) for the "average" university.

Since the Open University has no medical faculty and thus does not require the heavy capital expenditure such a faculty entails, and also is heavily weighted in arts where capital requirements are much less, five universities with faculties similar to the Open University were separated from the 44 conventional universities and a corresponding calculation made to the one discussed above. The five universities were Exeter, Hull, Keele, Leicester, and York. The same initial capital costs per student place were weighted by the Open University student proportions by faculty. They are arts 77%,

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[20] Data taken from The report of the Committee on Higher Education (Robbins Report), Appendix IV, updated to 1971 prices using U.G.C. price index.

Table III-A

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Conventional University Teaching Costs (1971 Prices)

Category	"Average" University	"Selected" University
	£000	£000
1. Capital	4,869	3,838
2. Academic Expenditure	9,372	7,688
3. Administrative	1,346	1,133
4. Maintenance	1,901	1,908
Total	17,488	14,567

Table I-C

Third- and Fourth-Level Courses[a]

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These proposals are subject to alteration, but give an idea of the probable range of courses which will be offered in 1973 or subsequent years.

Arts	War and society		Mathematics	Mathematics	
	The novel			Computer science	
	Problems of philosophy			Statistics	
	Art and design in the 19th and 20th centuries			Mathematics and its applications	
	Studies in instrumental music			Courses on special topics in mathematics	
Educational Studies	Education, economics, and polity		Social Sciences	Comparative government	2nd or 3rd level courses
	Language and associated cognitive development	2nd or 3rd level courses		People and organizations	
	Evaluation and assessment			Urban development	
	Administration and management			Theory and research in sociology	
Science	Biology, physiology of cells and organisms; ecology; biochemistry and molecular biology; evolutionary biology.			Economic growth, development and planning	
	Geology: endogenetic processes and products; exogenetic processes and products.			Communication	
	Chemistry: structure and mechanism in chemistry-organic and inorganic; principles of chemical processes; selected topics in chemistry.			A study of a selected geographic area	
	Physics: quantum theory and atomic physics; solid state physics; electromagnetism; statistical mechanics.			Research methods in the social sciences	
				Ideology and society	
			Inter-Faculty Courses	Design	
				Applied psychology	
				Quantitative economics	
				Business economics	
				Philosophy of the social sciences	
				History of scientific thought and discovery	
				Physical and technical optics	
				Technophysics	
				Mathematical physics	

[a] Ibid., pp. 22-23.

Normal entrance requirements will include an Honours degree from a British University or, in keeping with the philosophy of the Open University, evidence that the applicant possesses the intellectual capacity and ability to attain the necessary research standards. Applicants may be examined or assessed in some other way prior to registration. Initially all such students will be registered under the general heading "postgraduate student" rather than as a candidate for one of the three specific degrees. After one year of postgraduate studies when more information on the student will be available, the university will determine whether the candidate is suitable for the higher ranking of the postgraduate degrees or whether registration should be cancelled. Resident students will be supervised by a full-time staff member (or members) of the Open University, but external students will be supervised jointly by Open University staff and by an external supervisor, preferably located within reasonably close proximity to the student.

Formal courses will not be available to postgraduate students in the foreseeable future because of the priorities, dictated by the government, given to the undergraduate degree. However, credits will be awarded on research output evaluated by the Open University staff supervisor. Table I-D summarizes credit-unit requirements by degree. One unit of credit may be given for the equivalent of three months' full-time research (one year part-time). For the M.Phil. or Ph.D. a thesis or dissertation must be presented within three years of fulfilling the credit requirements. Table I-E summarizes the fees payable for each degree. Potential postgraduate students, while encouraged to pursue research in fields of research of interest to the Open University staff, will not be precluded from submitting other research topics. A postgraduate student, again consistent with the Open University philosophy, may elect to undertake interdisciplinary research projects for his degree. (Table I-F)

Starting in January 1973 the Open University, in accordance with its original program, will provide postexperience courses, which will be certificated but which will not lead towards any degree. These courses will be designed for persons seeking to extend their knowledge within their present occupational concerns and also for persons wishing to acquire knowledge in fields new to them. For such courses there are no formal entrance requirements, though because of the fact that they are postexperience, some background

Table I-D

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Credit Unit Requirements for Postgraduate Degrees[a]

Degree	Credit Units
B. Phil.	3
M. Phil.	6
Ph.D	9

[a]Holders of advanced degrees from other British universities may have the required number of credit units reduced by one unit in the degree of M. Phil. and Ph.D. Such a reduction requires approval of the senate of the Open University.

Table I-E

Postgraduate Degree Fees

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Degree	Registration Fee	Credit Fee	Examination Fee	Total
B. Phil.	$37.50	(3 x $62.50) $187.50	$50.00	$275.00
M. Phil.	$37.50	(6 x $62.50) $375.00	$87.50	$500.00
Ph.D.	$37.50	(9 x $62.50) $562.50	$125.00	$725.00

Table I-F

Postgraduate Students Registered During the Academic Year Ending December 1972[a]

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	Full-Time	Part-Time (Internal)[b]	Part-Time (External)	Total
Arts-based[c]	6	8	54	78
Science-based[d]	19	12	24	55
Total	25	30	78	133

[a]Source: Open University Planning Office Statistical Bulletin, April/May 1973, TABLE 2D.

[b]Members of the University's full-time staff.

[c]Arts-based: Students registered with the Faculties of Arts, Educational Studies, Social Sciences, and the Institute of Educational Technology.

[d]Science-based: Students registered with the faculties of Mathematics, Science, and Technology.

knowledge will be assumed. The typical course will be no longer than one year. These courses will employ the same format as the undergraduate courses using radio, television, correspondence material, evening and weekend tutorials, summer schools, computers, etc.

The first five courses will be:

(i) Biological Bases of Behavior

(ii) Computing and Computers

(iii) Electromagnetics and Electronics

(iv) Reading Development

(v) Reformation Studies

Table I-G details the duration and cost to the student of each course.

These costs are estimated to cover total cost of the courses and will vary according to the expected useful life of each course plus student demand. They are significantly higher than the prices charged to undergraduates for their courses which are subsidized to a considerable extent by the government. A total of 2100 students were studying postexperience courses in July 1973.

Table I-G

Postexperience Courses: Duration and Cost

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Course	Duration	Per Student Cost
Biological Basis of Behavior	January-November (full-year course)	$200
Computing and Computers	March-November	$175
Electromagnetics and Electronics	January-November	$200
Reading Development	March-November	$125
Reformation Studies	May-September	$75

APPENDIX II

Student Characteristics and Demand for the Open University

The Open University Planning Committee estimated from the Robbins Report that at least one million British adults (21-50) could benefit from a university education and that 10 percent of this number might be expected to take advantage of the Open University opportunity.

Another large group of potential students was composed of individuals who had taken higher education courses which did not lead towards a degree. This includes, for example, 250,000 school teachers.

It was estimated that of the approximately 100,000 students who annually apply for first-year conventional university places, 30,000, while holding adequate entrance requirements, will not be admitted through unavailability of places. If they have not been able to secure a place in a conventional university before they reach the age of 21 (minimum age requirement for the Open University) they might well seek entrance to the Open University.

Another source of potential demand lies in the annual 40,000 high school students, with a future university capability, who drop out of school at age 15 or 16 before they are eligible to take university entrance examinations. There were so many unknown factors in attempting to estimate the demand for the Open University that the range of possible student numbers emerging from a survey commissioned by the Planning Committee of the Open University was between 35,000 and 184,000. After some attempt to estimate demand it was decided, because of the many constraints the new Open University faced, that places would be offered to 25,000 students in the first year of operation, 1971. Dependent upon the attrition rate, a similar but adjustable annual intake for the following two to three years would be determined to achieve a maximum student body of 55,000 students.

The Open University received 130,000 inquiries and by the closing application date, August 1970, nearly 43,000 students had applied for admission. Of the 43,000 applicants, 24,344 were admitted and 24,191 actually enrolled. The admits paid a $25 initial tuition fee and were informed that while courses would begin in January the remainder of the tuition fee of $37.50 per undergraduate course would not be due until April. This was to allow students to decide whether they wished to continue at the Open University at minimal

cost to the student and also to allow the University its only opportunity to discourage unsuitable students from continuing. The University based this decision on the students' written reports and assessments by the class tutors. Of the 43,000 applying students almost one-half wished to take two courses. In the case of the 24,191 acceptances, it was decided to limit the number of students taking two courses to 20%; the number of courses actually taken was 28,723. The reasons for such a policy were twofold; first, insufficient Open University resources existed and, second, it was felt that the 20 hours or more per week of studying that two courses necessitated was beyond what could reasonably be expected from the majority of the students.

The students were admitted on a first-come, first-served basis subject to the following constraints. Initially only United Kingdom residents would be admitted and while no upper age limit was imposed, as already mentioned, students under the age of 21 would not be considered.

Three additional constraints were concerned with achieving

(i) a balanced geographical mix

(ii) a balanced subject mix

(iii) a balanced occupational mix.

Within the 25,000 student quota and a maximum of 30,000 course quota targets, quotas were established for each of the three principal constraints after the applications had been analyzed. Table IIA gives details on student applications and provisional allocation of places by region.

As can be seen from Table II-A, the aim of a balanced geographical mix, weighted by population, was achieved. It should be noted, however, that the proportion of individuals qualifying for admission to conventional universities is not randomly distributed by geographic area, after adjustment is made for population density. This is due to many factors, most of which are highly correlated with income. Generally, with a few exceptions such as the industrial Midlands and the extreme Southeast and Southwest of England, the further north the lower per capita income. The Open University's policy of admitting students, taking into account the two other major constraints, according to regional population density, in no way attempts to correct the existing imbalance. Table II-B details Open University students by subject application, quota, and admissions.

Table II-A

Distribution of Students by Region[a]

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Region	APPLICANTS				PROVISIONAL ALLOCATION OF PLACES		
	Number	Percentage of total	Estimate of percentage of pop. in region	Quota set after scrutiny of application	Percentage allocated places	Absolute number allocated places	Actual number admitted
01 London	7,571	18.5	17.9	18.2	18.0	4,503	4,217
02 South	4,621	11.3	8.9	10.1	11.3	2,813	2,693
03 South West	2,332	5.7	6.1	5.9	5.6	1,411	1,453
04 West Midlands	3,452	8.5	9.2	8.9	9.0	2,238	2,193
05 East Midlands	2,699	6.6	7.0	6.8	7.1	1,765	1,629
06 East Anglia	3,497	8.6	7.8	8.4	9.1	2,282	2,182
07 Yorkshire	3,112	7.6	8.5	8.0	7.8	1,957	1,927
08 North West	4,337	10.6	12.1	11.3	11.5	2,873	2,662
09 North	2,080	5.1	5.5	5.3	5.4	1,356	1,328
10 Wales	1,801	4.4	4.9	4.6	3.6	892	1,067
11 Scotland	3,787	9.3	9.4	9.3	9.0	2,262	2,151
12 Northern Ireland	1,528	3.7	2.7	3.2	2.6	648	842
	40,817	99.9	100.0	100.0	100.0	25,000	24,344

[a]Early development of the Open University, p. 78. Care must be taken to distinguish the number of courses from the number of students in Tables II-B through II-I.

Table II-B

Distribution of Students by Courses[a]

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Course	Number of Applicants	%	Target Quotas	%	Number of Admissions	%
Arts	16,939	27.3	8,000	26.7	7,561	26.2
Social Sciences	21,564	34.7	8,000	26.7	7,731	26.8
Mathematics	12,039	19.4	7,000	23.3	6,885	23.9
Science	11,605	18.7	7,000	23.3	6,673	23.1
Total	62,147	100.1	30,000	100.0	28,850	100.0

[a]For figures for Table II-B see Early Development, p. 76.

The rising proportion of students applying for social science places in conventional universities in Britain in the 1960s is reflected in the distribution of Open University applications. This is due in considerable part to the increasing emphasis in British high schools on the social sciences, which came about through attempts to broaden high school curricula. It should also be noted, however, that there are no explicit course requirements for social science courses in the Open University. Reasons for the Open University's failure to offer courses in accordance with revealed student preferences are complex; the fact that staffing and course development decisions had to be made prior to receiving student applications, and that externalities and economies of scale are present within large faculties suggested the faculty sizes which were then created and which in turn determined the distribution of students by faculty.

Details of student distribution by occupation are contained in Tables II-C and II-I.

As has been stated, one of the aims of the Open University was to give an opportunity for university study to anyone interested, and part of Harold Wilson's philosophy of egalitarianism included not only an equalizing of incomes but also an equalizing of higher educational opportunities. However, the hoped for high interest on the part of blue-collar workers in the Open University, for example, did not materialize in the initial applications.

As can be seen from Table II-C, however, admissions were approximately in proportion to the applications received. This, of course, is almost identical to the quota targets set after scrutiny of the applications.

Tables II-D, E, and F essentially repeat Tables II-A, B, and C with the corresponding data for the years 1972 and 1973. The salient points emerging from a comparison of the 1971, 1972, and where the differences are substantive, the 1973 figures, are:

a. A reduction in the number of individuals applying from 40,817 to 34,222 to 32,046.
b. No significant changes in the geographical mix.
c. By course allocation, large reductions in the number of students enrolled in Arts (7,561 to 6,160 to 5,000), in mathematics (6,885 to 4,510 to 2,900) and in Science (6,673 to 4,400 to 3,340).

Table II-C

Distribution of Students by Occupation[a]

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APPLICANTS (Numbers in brackets show graduates included in preceding figure)						
Occupational Group	Number of Applicants	Percentage of total	Quota percentage set after scrutiny of applicants	Percentage allocated places	Quota percentages as absolute numbers	Number admitted
1 Housewives	3,758	8.9 (0.3)	10.0 (0.1)	9.6 (0.2)	2,500 (25)	2,484
2 Armed Forces	699	1.7	2.0 (0.1	2.0	500 (25)	497
3 Administrators and Managers	2,830	6.6 (0.3)	4.5 (0.1)	5.4 (0.2)	1,125 (25)	1,118
4 Teachers	14,642	33.6 (2.3)	30.0 (1.0)	33.0 (1.3)	7,500 (250)	7,453
5 Professions and the Arts	4,869	11.3 (0.6)	8.5 (0.1)	9.7 (0.3)	2,125 (25)	2,111
6 Qualified Scientists and Engineers	3,275	7.3 (0.7)	8.0 (0.1)	9.0 (0.3)	2,000 (25)	1,987
7 Draughtsmen, laboratory assistants and technicians	3,037	7.4 (0.1)	9.0 (0.1)	9.1 (0.1)	2,250 (25)	2,235
8 Electrical, electronic, metal and machines and allied trades	730	1.8	3.0 (0.0)	2.3	750 (0)	745
9 Other manufacturing, farming, mining, construction, transport and communications	1,171	2.8	5.0 (0.1)	3.1	1,250 (25)	1,242
10 Clerical and office staff	3,324	8.1 (0.1)	10.0 (0.1)	8.0 (0.1)	2,500 (25)	2,484
11 Shopkeepers, sales, services and sport, recreation workers, Fire Brigade and Police	1,409	3.4	4.5 (0.1)	3.7	1,125 (25)	1,118
12 Not working (other than housewives), retired, independent means	1,040	2.4 (0.1)	3.0 (0.1)	2.4 (0.1)	750 (25)	746
13 In institutions	33	0.1	0.5 (0.0)	0.1	125 (0)	124
	40,817	95.4 (4.5)	98.0 (2.0)	97.4 (2.6)	24,500 (500)	24,344

[a] Early Development, p. 79.

Table II-D

Distribution of Students by Courses 1971, 1972 and 1973[a]

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FOUNDATION COURSE	APPLICANTS 1971 Number	%	1972 Number	%	1973 Number	%	ALLOCATION 1971 Number	%	1972 Number	%	1973 Number	%
Arts	16939	27.3	12356	29.1	11584	31.6	8000	26.7	6160	24.9	5000	24.7
Mathematics	12039	19.4	6310	14.9	4094	11.1	7000	23.3	4510	18.2	2900	14.1
Science	11605	18.7	5468	12.9	4115	11.2	7000	23.3	4400	17.8	3340	16.3
Social Sciences	21564	34.7	13967	32.9	12236	33.4	8000	26.7	7480	30.2	6000	29.4
Technology	-	-	4332	10.2	3387	9.2	-	-	2200	8.9	3210	11.3
M.S.T.	-	-	-	-	2166	3.5	-	-	-	-	880	4.3
Totals	62,147	100.1	42,442	100.0	36,682	100.1	30,000	100.0	24,750	100.0	20,430	100.1

[a] Analysis of Applications and Allocation of Places for 1972 Courses, Open University, 1972, p. 4. Analysis of Applications and Allocation of Places for 1973 Courses, Open University, 1973.

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Table II-E

Distribution of Students by Courses 1971 and 1972[a]

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REGIONAL ANALYSIS

Region, with estimated U.K. adult population percentage		Applicants						Allocations		
		1971 %	1972 Total Number	Men	Women %	1972 Total %	Target Quota % Set	1971 %	1972 %	1972 Number
London	17.9	18.5	7445	63.1	36.9	21.8	19.8	18.0	19.8	4175
South	8.9	11.3	4247	65.5	34.6	12.4	10.6	11.3	10.6	2224
South West	6.1	5.7	1816	68.1	31.9	5.3	5.9	5.6	5.7	1239
West Midlands	9.2	8.5	2756	70.7	29.3	8.1	8.7	9.0	8.6	1833
East Midlands	7.0	6.6	2053	69.3	30.7	6.0	6.5	7.1	6.5	1375
East Anglia	7.8	8.6	2883	66.6	33.3	8.4	8.1	9.1	8.1	1714
Yorkshire	8.5	7.6	2360	69.2	30.8	6.9	7.5	7.8	7.7	1590
North West	12.1	10.6	3737	69.5	30.5	10.9	11.3	11.5	11.5	2388
Northern	5.5	5.1	1619	71.2	28.8	4.7	5.2	5.4	5.1	1097
Wales	4.9	4.4	1305	69.8	30.2	3.8	4.5	3.6	4.4	945
Scotland	9.4	9.3	2906	64.8	35.2	8.5	8.9	9.0	9.0	1882
Northern Ireland	2.7	3.7	1095	71.8	28.2	3.2	2.9	2.6	3.0	603
Totals		99.9	34,222			100.0	99.0	100.0	100.0	21,065

[a] Early Development, p.5.

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Table II-F

Distribution of Students by Occupation 1971 and 1972[a]

Code	Occupation Group	Applicants 1971 %	Applicants 1971 Total Number	Applicants 1971 Men %	Applicants 1972 Women %	Applicants 1972 Total %	Target Quota % Set	Allocations 1971 %	Allocations 1972 %	Allocations 1972 Number
01.	Housewives	9.2	3763	0.1	10.9	11	11.0	9.8	10.8	2270
02.	Armed Forces	1.7	577	1.6	0.0	1.6	1.7	2.0	1.9	397
03.	Administrators and Managers	6.9	1572	4.3	0.3	4.6	4.6	5.6	4.7	999
04.	Teachers and Lecturers	35.9	10327	19.8	10.4	30.2	30.2	34.3	29.9	6306
05.	The Professions and the Arts	11.9	4283	8.0	4.6	12.6	12.6	10.0	12.5	2630
06.	Qualified Scientists and Engineers	8.0	1486	4.3	0.1	4.4	4.4	9.3	4.8	1009
07.	Technical Personnel including Data Processing, Draughtsmen and Technicians	7.5	4084	11.1	0.8	11.9	11.9	9.2	12.1	2555
08.	Electrical, electronic, metal and machines, engineering and allied trades	1.8	1017	3.0	0.0	3.0	3.1	2.3	3.2	681
09.	Farming, mining, construction and other manufacturing		772	2.2	0.1	2.3	2.3		2.3	491
10.	Communications and Transport air, sea, road and rail	2.8	476	1.2	0.1	1.3	1.3	3.1	1.3	280
11.	Clerical and Office Staff	8.2	3224	5.3	4.1	9.4	9.4	8.1	9.7	1881
12.	Shopkeepers, sales, services, sport and recreation workers, fire brigade and police	3.4	1514	3.8	0.6	4.4	4.4	3.7	4.2	895
13.	Retired, independent means, not working (other than housewives) students	2.5	1066	2.2	0.9	3.1	3.1	2.5	3.0	647
14.	In institutions, e.g., prison, chronic sick, etc.	0.1	61	0.1	0.0	0.1	0.2	0.1	0.1	24

[a] Early Development, p. 6.

Part of the reason for the decreases in Mathematics and Science can be attributed to the introduction of the new technology foundation course which drew 4,332 applicants in 1972 and 3,387 in 1973 and which was allocated 2,200 and 2,310 students respectively. The number of Social Science allocations increased slightly from 1971 and 1972 (7,480 to 7,731), and fell in 1973 (to 6,000). The total of all foundation course allocations was reduced from 28,850 to 24,750 to 20,430. This was due to a cut-back in budgeted funds for 1972-1973 made by the newly elected Conservative Government, essentially forcing a reduction in the intended 1973 total student body from 55,000 to between 36,000 and 42,000. (See Table II-G.)

d. By occupational mix, significant changes occurred in applications for, and allocation of, student places.

The most important of these, in terms of the Open University's aim of extending higher educational opportunities, is to be found in the reduction of the numbers of applications from occupation groups 02 through 06 (white-collar workers) from 26,315 (64.5% of total applications) in 1971 to 18,245 (53.3% of total applications) in 1972 and an increase in the numbers from occupation groups 07 through 12 (blue-collar workers) from 9,671 (23.7% of total applications) in 1971 to 11,087 (32.4% of total applications) in 1972. On the admits side, total numbers allocated places from occupation groups 02 through 06 fell from 13,166 (61.2% of total admits) in 1971 to 11,341 (53.8% of total admits) in 1972. In occupation groups 07 through 12 (blue-collar workers) total admits also fell from 7,824 in 1971 to 6,783 in 1972, but their share of total admits rose from 26.4% in 1971 to 32.8% in 1972. Little further change in relative numbers occurred in 1973. (See Table II-I.)

As noted above, given no further change in governmental policy, the Open University had planned a steady-state undergraduate student body of between 36,000 and 42,000 with a probable figure of 37,500. In fact, the number of students "live" in the University in May 1973 was 38,200. This figure can be compared with the approximately 200,000 undergraduates in the 44 conventional universities, the 28,500 enrolled for a degree awarded by the Council for National Academic Awards (CNAA), and the 19,200 students enrolled for the external degrees of the University of London.

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Table II-G

Comparison of Applicants and Admits by Course (Total Numbers and Percentages) 1971, 1972 and 1973

Foundation Course	Applicants						Admits					
	1971.		1972.		1973.		1971.		1972.		1973.	
	Total Number of Courses	Total % of Courses	Total Number of Courses	Total % of Courses	Total Number of Courses	Total % of Courses	Total Number of Courses	Total % of Courses	Total Number of Courses	Total % of Courses	Total Number of Courses	Total % of Courses
Arts	16,939	27.3	12,356	29.1	11,584	31.6	7,561	26.2	6,160	24.9	5,000	24.7
Mathematics	12,039	19.4	6,310	14.9	4,094	11.2	6,885	23.9	4,510	18.2	2,900	14.1
Science	11,605	18.7	5,468	12.9	4,115	11.2	6,673	23.1	4,400	17.8	3,340	16.3
Soc. Sciences	12,564	34.7	13,976	32.9	12,236	33.4	7,731	26.8	7,480	30.2	6,000	29.4
Technology	N.A.	-	4,332	10.2	3,387	9.2	N.A.	-	2,200	8.9	2,310	11.3
M.S.T.	N.A.	-	N.A.	-	1,266	3.5	N.A.	-	N.A.	-	880	4.3
Totals	62,147	100.1	42,442	100.0	36,682	100.0	28,850	100.0	24,750	100.0	20,430	100.1

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Table II-H

Comparisons of Applicants and Admits by Region 1971 and 1972

Region With Estimated U. K. Adult Population Percentage		Applicants				Admits			
		1971		1972		1971		1972	
		Total Number	Total %	Total Number	Total %	Total Number	Total %	Total Number	Total %
London	17.9	7,571	18.5	7,445	21.8	4,217	18.0	4,175	19.8
South	8.9	4,621	11.3	4,247	12.4	2,693	11.3	2,224	10.6
Southwest	6.1	2,332	5.7	1,816	5.3	1,453	5.6	1,239	5.7
West Midlands	9.2	3,452	8.5	2,756	8.1	2,193	9.0	1,833	8.6
East Midlands	7.0	2,699	6.6	2,053	6.0	1,629	7.1	1,375	6.5
East Anglia	7.0	3,497	8.6	2,883	8.4	2,182	9.1	1,714	8.1
Yorkshire	8.5	3,112	7.6	2,360	6.9	1,927	7.8	1,590	7.7
Northwest	12.1	4,337	10.6	3,737	10.9	2,662	11.5	2,388	11.5
Northern	5.5	2,080	5.1	1,619	4.7	1,328	5.4	1,097	5.1
Wales	4.9	1,801	4.4	1,305	3.8	1,067	3.6	945	4.4
Scotland	9.4	3,787	9.3	2,906	8.5	2,151	9.0	1,882	9.0
Northern Ireland	2.7	1,528	3.7	1,095	3.2	842	2.6	603	3.0
Totals		40,817	99.9	34,222	100.0	24,344	100.0	21,065	100.0

Table II-I

BEST COPY AVAILABLE Comparison of Applicants and Admits by Occupation 1971 and 1972

Code	Occupation Group	Applicants				Admits			
		1971		1972		1971		1972	
		Total Number	Total %	Total Number	Total %	Total Number	Total %	Total Number	Total %
01.	Housewives	3,758	9.2	3,763	11.0	2,484	9.8	2,270	10.8
02.	Armed Forces	699	1.7	577	1.6	497	2.0	397	1.9
03.	Administrators and Managers	2,830	6.9	1,572	4.6	1,118	5.6	999	4.7
04.	Teachers and Lecturers	14,642	35.9	10,237	30.2	7,453	34.3	6,306	29.9
05.	The Professions and the Arts	4,869	11.9	4,283	12.6	2,111	10.0	2,630	12.5
06.	Qualified Scientists and Engineers	3,275	8.0	1,486	4.4	1,987	9.3	1,009	4.8
07.	Technical Personnel including Data Processing, Draughtsmen and Technicians	3,037	7.5	4,084	11.9	2,235	9.2	2,555	12.1
08.	Electrical, electronic, metal and machines, engineering and allied trades	730	1.8	1,017	3.0	745	2.3	681	3.2
09.	Farming, mining, construction and other manufacturing	1,171	2.8	772	2.3	1,242	3.1	491	2.3
10.	Communications and Transport air, sea, road and rail			476	1.3			280	1.3
11.	Clerical and Office Staff	3,324	8.2	3,224	9.4	2,484	8.1	1,881	9.7
12.	Shopkeepers, sales, services, sport and recreation workers, fire brigade and police	1,409	3.4	1,514	4.4	1,118	3.7	895	4.2
13.	Retired, independent means, not working (other than housewives) students	1,040	2.5	1,066	3.1	746	2.5	647	3.0
14.	In institutions, e.g., prison, chronic sick, etc.	33	0.1	61	0.1	124	0.1	24	0.1
	Totals	40,817	99.9	34,222	99.9	24,344	100.0	21,065	100.5

APPENDIX III

Cost Calculations for Conventional Universities in the U.K.

Table III-A summarizes cost calculations for the "conventional universities."

Line 1. Capital Costs

In conventional universities capital costs per student place have been estimated[20] in 1971 prices at

(i) £1850 in Arts

(ii) £3700 in Science and Medicine

(iii) £5397 in Technology.

The proportions of incoming 1971 students to conventional universities are 47% Arts, 37% Science and Medicine, and 16% Technology. Thus the capital cost per "average" student place (using the above weights) is £3102 (£1850 x .47 + £3700 x .37 + £5397 x .16) which yields a total capital cost of £65,143,449 (£3,102 x 21,000) for 21,000 students (i.e., the equivalent of 42,000 "courses," the Open University base used previously). Assuming a depreciation rate of 1 1/2 percent and an interest rate of 10% per annum, annual capital cost for the "average" university is therefore £7,491,497 (£65,143,449 x 11.5%). If 65% of such costs are allocated to teaching output the estimate for total annual capital costs becomes £4,869,000 (£7,491,497 x 65%) for the "average" university.

Since the Open University has no medical faculty and thus does not require the heavy capital expenditure such a faculty entails, and also is heavily weighted in arts where capital requirements are much less, five universities with faculties similar to the Open University were separated from the 44 conventional universities and a corresponding calculation made to the one discussed above. The five universities were Exeter, Hull, Keele, Leicester, and York. The same initial capital costs per student place were weighted by the Open University student proportions by faculty. They are arts 77%,

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[20] Data taken from The report of the Committee on Higher Education (Robbins Report), Appendix IV, updated to 1971 prices using U.G.C. price index.

Table III-A

Conventional University Teaching Costs (1971 Prices)

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Category	"Average" University	"Selected" University
	£000	£000
1. Capital	4,869	3,838
2. Academic Expenditure	9,372	7,688
3. Administrative	1,346	1,133
4. Maintenance	1,901	1,908
Total	17,488	14,567

science 13%, and technology 10%. This produced a weighted total capital cost per student place of £2445, which yields a total capital cost of £51,349,410 for 21,000 students. Taking the same depreciation and interest rates and a 65% teaching allowance, as previously, yields an estimate for a total annual capital cost of £3,838,000.

Line 2. Academic Expenditure Costs

Academic expenditures include salaries of teaching and research staff, departmental wages, department and laboratory maintenance, library costs, and miscellaneous academic expenses. Table III-B details these costs. The five-university total in 1968 prices is converted to 1971 prices to obtain a figure of £9,508,086 (£7,793,513 x 1.22). These five universities have a full-time equivalent undergraduate student body of 16,880. Thus to convert all costs to the 21,000 Open University Student base (42,000 courses) discussed previously, the five-university cost figures must be multiplied by 1.244 (21,000 ÷ 16,880). Similarly, to convert the 44 total university cost figures to the same base, a conversion factor of .069325 is used [i.e., 21,000 ÷ 302,920 (total full-time equivalent undergraduate student population)].

Thus the total academic expenditures adjusted for a 42,000 course (21,000 student) equivalent university are £11,828,059 (£9,508,086 x 1.244) for the average "selected" university, and £14,418,333 (£207,981,725 x .069325) for the "average" of all universities.

Line 3. Administration Costs

Administration costs are shown in Table III-C.

The conversion procedures adopted for calculations in Line 2 were used for Administration Costs. The resulting figure for the "selected" university is £1,113,170 and for the "average" university £1,345,864. On the same reasoning adopted in the Open University discussion, 100% of these costs are attributable to teaching output.

Table III-B

Academic Expenditures in Conventional Universities

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University	Teaching and Research Costs (1968 £s)	Academic Service Costs (1968 £s)	Other Gen. Educational Expenditures (1968 £s)	Cols. 2+3+4 (1968 £s)	Col. 5x1.22 (1971 £s)	42,000 Course Equivalents Col. 6x1.24
Exeter	1,343,347	206,498	60,967			
Hull	1,551,193	280,963	86,439			
Keele	867,662	163,212	46,884			
Leicester	1,697,496	211,554	69,226			
York	1,059,675	130,851	17,546			
5 Univ. Total	6,519,373	993,078	281,062	7,793,513	9,508,086	11,828,059
44 Univ. Total	149,500,207	15,000,816	5,975,801	170,476,824	207,981,725	Col. 6 x.069 14,418,333

Table III-C

Administration Costs in Conventional Universities

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University	Administrative Costs (1968 Ls)	(1971 Ls)	42,000 Course Equivalent x 1.244
Exeter	157,282		
Hull	184,864		
Keele	105,192		
Leicester	132,440		
York	166,868		
5 Univ. Total	746,646	910,908	1,133,170
			x .069325
44 Univ. Total	15,912,981	19,413,837	1,345,864

Line 4. Maintenance Costs

Again the same conversion procedures were adopted as in Lines 2 and 3 producing Maintenance Costs of £2,935,053 and £2,924,120 for the "selected" and "average" universities respectively. However since a portion of such costs is attributable to student accommodations, research output, etc., only 65% has been assumed attributable to teaching output. Thus the final Maintenance Cost for the "selected" university is £1,907,784 (£2,935,053 x 65%) and for the "average" university £1,900,678 (£2,924,120 x 65%). Table III-D.)

If each institution is standardized to represent a full-time undergraduate equivalent student body of 21,000, costs per full-time student equivalent for teaching output can be calculated by dividing total teaching costs in Table III-A by 21,000. This yields costs of £694 and £833 in 1971 prices for the selected and average university respectively and £830 and £997 in 1973 prices.

Table III-D

Maintenance Costs in Conventional Universities

University	Maintenance Costs (1968 £s)	(1971 £s)	42,000 Course Equivalents x 1.244
Exeter	495,820		
Hull	425,329		
Keele	293,603		
Leicester	325,062		
York	394,093		
5 Univ. Total	1,933,907	2,359,367	2,935,053
			x. 069325
44 Univ. Total	34,573,672	42,179,880	2,924,120

APPENDIX IV

Cost Estimates of an Open University in the United States

In estimating the costs of an Open University in the United States, it will be assumed that the size of the Open University under study will be 55,000 students. This will enable comparisons to be made with the United Kingdom Open University since its existing fixed costs have been determined with this size of student body in mind. This, of course, in no way implies that 55,000 students constitute an optimum-sized Open University (the optimum would be determined by the demand for an Open University education, and the relative efficiency of the Open University compared with alternatives) but since the factor inputs of the United Kingdom model have been isolated, it is possible to price this model in United States prices and compare it with conventional United States universities and colleges as was done for the United Kingdom. It may well be that a United States Open University could benefit substantially from the experience of the Open University in the United Kingdom and essentially improve upon the British model. For example, the substantial initial dropout rates might be avoided by a more careful selection procedure based on better student information and also by attracting a proportion of the large number of United States citizens who started but never completed college. Another area where significant economies might occur is in broadcasting. The United Kingdom Open University initially had essentially no choice in the selection of a broadcasting company since the only national network offering noncommercial rates and having excess capacity was government owned. It is possible that the rates charged for producing programs could be substantially reduced in a competitive market. As will be seen, rates quoted in the United States are as small as 7.5% of the British costs though quality comparisons are not possible because of the lack of equivalent programs.

The category classification of costs used for the United Kingdom Open University will also be used for the United States Open University. (Table IV-A.)

The way in which the figures for each item in Table 25 (Chapter 6) were calculated is discussed below. Some of the cost estimates below must be treated with caution partly because wide variances exist in quoted cost

Table IV-A

United States Open University Teaching Costs

(1971 dollars)

		$000	
	FIXED COSTS		
	Category		
1.	Capital	2,330	5%
2.	Central Administration	3,590	8%
3.	Regional Administration	2,952	7%
4.	Faculties, Library, and Computer Services	2,895	7%
5.	Broadcasting	4,228	10%
6.	Miscellaneous	1,518	3%
7.	Total Fixed	17,513	40%
	VARIABLE COSTS		
8.	Correspondence Materials (including experimental Kits)	3,435	8%
9.	Tutors and Counseling	10,282	24%
10.	Summer Schools	7,018	16%
11.	Data Processing	413	1%
12.	Examinations	384	1%
13.	Regional Administration	2,966	7%
14.	Study Center Rentals	1,500	3%
15.	Total Variable	25,998	60%
16.	Total Costs	43,511	

figures for different items and partly because the institutional educational infrastructure in the United States differs from its United Kingdom counterpart.

Line 1. Capital Costs

One possible way to estimate United States Open University capital cost would be to follow the method used by Bowen and Douglass[21] who calculated the rental value of capital in estimating instructional costs in liberal arts colleges. Unfortunately details are not available on the United Kingdom Open University equipment and all facilities, and thus it is impossible to cost out each item in United States prices. However, for those items which could be compared, it was found that United Kingdom prices, when converted to United States prices using an exchange of £1 to $2.5 were almost identical to United States prices; for example, inputed rental costs for similar space allotments, computer facilities, postal machines, and office furniture. While significant differences might well exist in other capital items, it would require a major research effort to produce exact comparable figures, and it is doubtful if the benefits from such research would balance the costs since an estimating error in the annual capital costs of even 50 percent would be relatively insignificant in total figures.

Total costs for this item, therefore, using the official exchange rate are $2,330,000 (£932,000 x 2.5) in 1971 prices.

Line 2. Central Administration Costs

Table IV-B shows total salary costs in this category.

Central Administration, again using the United Kingdom factor input mix, will consist of a staff of 400 individuals. Approximately 100 of these will

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[21] H. R. Bowen and G. K. Douglass, Efficiency in Liberal Education, issued by the Carnegie Commission on Higher Education, McGraw-Hill, 1971.

Table IV-B

Central Administration Salary Costs

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Position	Number	Average Annual Salary	Total
Senior Administrators	100	$15,650	$1,565,000
Senior Clerical Staff	50	8,500	425,000
Clerical Staff	250	6,400	1,600,000
Total			3,590,000

be senior administrators with an average annual salary of $15,650.[22] There will be 50 senior clerical staff, and 250 clerical staff with annual salaries of $8,500 and $6,400, respectively.

Line 3. Regional Administrative Costs

Again assuming 13 regions plus one central region, costs in this category are found by multiplying the numbers of directors, senior counsellors, staff tutors, and clerical staff by their respective salaries. Table IV-C showed these calculations; all of these costs are attributable to teaching output.

Line 4. Faculties, Library, and Computer Services

To price out faculty members, it was necessary to convert United Kingdom academic ranks to their United States equivalents. This is done in Table IV-D.

Table IV-E shows data regarding academic staffing requirements for a 55,000 student Open University. Salary figures are also given. It should be noted that some United Kingdom faculty ranks do not have precise United States equivalents and a certain amount of overlapping occurs between classifications.

If one uses a 50% teaching plus teaching administration--50% research, etc. division of academic faculty time, one-half of the $3,234,745 total is attributable to teaching output, i.e., $1,617,373 ($3,234,745 ÷ 2).

Annual library costs are made of staff salaries plus costs of books, periodicals, etc. The staff consists of 25 personnel ranging from senior librarians to clerical assistants. The mean annual salary for all full-time library staff in the United States in 1969 was $9,388.[23] Adjusting for wage inflation since 1969,[24] the average salary for library staff becomes $10,608 ($9,388 x 1.13). Thus total library annual staff costs are $265,211 ($10,608 x 25).

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[22] Salary estimates in these sections taken from University of California administrative and clerical salaries.

[23] Library Statistics of Colleges and Universities, Fall 1969, Analytic Report O. E. 15031-69, Washington, D. C., 1971.

[24] Economic Report of the President, Washington, D. C.: U.S.G.P.O., 1972.

Table IV-C

Regional Administration Salary Costs

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Position	Number	Average Annual Salary	Total
Regional Director	14	$17,100	$239,400
Senior Administrator	14	17,100	239,400
Senior Counsellor	42	15,000	630,000
Senior Tutor	105	12,800	1,344,000
Clerical Staff	78	6,400	499,200
Total			2,952,000

Table IV-D

United Kingdom - United States Academic Ranks

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United Kingdom	United States Equivalent
Professor	Professor
Reader	
Senior Lecturer	Associate Professor
Lecturer	
Assistant Lecturer	Assistant Professor
Research Assistant	Instructor
Technician	Science Laboratory Assistant

Table IV-E

Academic Salary Costs

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Rank	Number	Average Annual Salary[a]	Total
Professor	32	$19,233	$615,456
Associate Professor	40	13,797	551,880
Assistant Professor	113	12,248	1,384,024
Instructor	51	9,635	491,385
Science Laboratory Assistant	40	4,800	192,000
Total	276		3,234,745

[a]Salary figures taken from "The Cost of Higher Education 1971-72," College Management, January 1972, p. 13. The following quotation is of interest here.

> For many colleges, President Nixon's wage-price freeze was post facto; they had already frozen salaries and stopped hiring to try to balance runaway budgets. Several state systems, as previously mentioned, still have no budget at midyear; legislatures have approved no appropriations for higher education, leaving the state colleges and universities operating on the "hold button."
>
> For other institutions, hurting financially, but reluctant to risk a salary hassle, Nixon's action may have provided an official umbrella to protect administrators from the storm that inevitably follows any "holding of the line" on salaries.
>
> In recent years, salaries--although they take the biggest bite out of every institution's budget--have barely kept pace with the rise in the cost of living, gaining about seven percent annually, says USOE.
>
> Between 1959-1960 and 1969-1970, the median annual salary for instructional staff members in four-year institutions rose 75 percent. In administrative positions, increases ranged from 69 percent for the dean of admissions to 128 percent for the chief administrative officer in two-year colleges, according to the National Education Association's biennial survey (see CM, January 1971, p. 14).
>
> Results of the next NEA survey, covering salaries for the current year, will not be available for some time, and--due to freezes, defrosting and deficits--may show a change in the pattern which has been fairly consistent for more than a decade.
>
> Estimated median annual salaries presently being received by key administrative and instructional staff members are shown in Table 4, p. 13. COLLEGE MANAGEMENT's research department estimated them by applying the seven percent annual increase, suggested by USOE for each of the past two years, to the median annual salaries reported in NEA's survey for 1969-70.

Since the book and periodicals market is international, the United Kingdom Open University books, etc., costs have been multiplied by the exchange rate to produce an annual books, etc., cost of $112,500 (£45,000 x 2.5). Thus total library costs, 100% of which, as explained previously, are attributable to teaching output, are $377,711 ($265,211 + $112,500).

The student computer services require a staff of 32. The average salary for these individuals in the United Kingdom was £3,125 per annum. Comparable computer personnel salaries in the United States are estimated to average $12,500 per annum. This figure is approximately 25% higher than the average of all computer staff salaries[25] in institutions of higher learning in the United States because the Open University computer staff is biased toward more senior computer personnel who have an academic as well as a technical function. Thus, total computer salaries equal $400,000 ($12,500 x 32). Other computer costs directly comparable to United Kingdom costs as discussed earlier are $500,000 (£200,000 x 2.5).

Thus total annual computer costs are $900,000 ($400,000 + $500,000). Total costs, therefore, for Line 4 are $2,894,544 ($1,617,373 + $377,171 + $900,000).

Line 5. Broadcasting Costs

United Kingdom television production costs of £8,000 per hour appeared to the investigators to be inordinately high. KQED, a television station in San Francisco, quoted total costs for a one-hour lecture format production from $1,370 to $1,670; i.e., almost negligible when compared with the British equivalent of $20,000 (£8,000 x 2.5). Further research in this area unearthed the information that a regional commercial television company in Britain (Grampian Television) was able to produce one-hour lecture/discussion programs for $825 (£330 x 2.5). Part of this wide discrepancy in cost figures can be explained by qualitative differences though no information is available on how more effective, in terms of learning, the more expensive programs are. For example, it was discovered that in the £8,000

[25] Selected Statistics on Educational Personnel, Washington, D. C., 1970.

per hour productions, a program producer and his staff might produce no more than six half-hour programs per annum, i.e., their total annual output; because of this and accompanying restrictive employment practices, costs per program can rise very rapidly. It is impossible to know what television costs would be in the United States without a substantial amount of research input and perhaps even only when an institution actually negotiated with television companies, would the precise costs emerge. Another possibility in this area, which the United Kingdom Open University is currently considering involves setting up its own television and radio facilities.

Faced with the range of possibilities which emerged, the procedure initially adopted has been to convert British television and radio costs using the exchange rate. This produces a total cost for Line 5 of $4,227,500 (£1,691,000 x 2.5) with the proviso that such costs might be reduced by over 50 percent, and that the figure used is an upper limit.

Line 6. Miscellaneous Costs

In the United Kingdom, miscellaneous costs which include media production, staff/student facilities, educational technology, and maintenance were approximately 9.5% of the total of costs in Lines 1-5. Using the same ratio for the United States Open University produces a figure of $1,518,085 for this category ($15,995,000 x .09491), all of which is again attributable to teaching output.

Line 7. Total Fixed Costs

Total fixed costs, which are found by summing the individual totals for Lines 1-6, equal $17,513,000.

Line 8. Correspondence Materials Costs (including experimental kits)

Total costs for this category are calculated in Table IV-F.

Costs include printing of correspondence materials, postage and packaging, audio-visual aids, and home experimental kits. With the exclusion of postage and packaging, the costs of the remaining items do not differ significantly between the United Kingdom and the United States, and thus the exchange rate can be used directly. Postal rates in the United States are approximately 35%

Table IV-F

Correspondence Materials Costs

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Item	Cost per "course"	Number of Course	Total Costs
Correspondence	$20.00	60,500	$1,210,000
Postage	6.75	60,500	408,375
Packaging and handling	8.00	60,500	484,000
Experimental Kits	82.50	16,154	1,332,705
Total			3,435,080

higher than the United Kingdom postal rates.[26] Assuming, as before, labor handling charges to be 60% higher in the United States compared with the United Kingdom and postage 35% higher, the postage and packaging costs will be approximately 50% greater in the United States.

The number of student courses requiring experimental kits is confined to those in Science and Technology. Since the proportion of students assumed to be taking these courses, i.e., the United Kingdom proportion, is 26.7 percent, the actual number of experimental kits required per annum is 16,154; this yields a cost of $1,332,705 (£33 x 2.5 x 16,154). Thus the total for this category is $3,435,080 ($1,210,000 + $408,375 + $484,000 + $332,705).

Line 9. Tutors and Counselling Costs

Tutoring and counselling costs in the United Kingdom amounted to £1,785,000 for 42,000 courses. Again, assuming staff costs to be 60% higher in the United States, as discussed previously, and using a student body of 55,000 (60,500 courses) in the United States Open University, the total costs for this category amount to $10,281,600 [£1,785,000 x 2.5 x 1.6 x 1.44 (i.e., 60,500 ÷ 42,000)].

Line 10. Summer School Costs

Summer school costs average £27 per course in the United Kingdom. This figure includes approximately £10 for room and board for six days and £17 for tuition. The University of California quotes room and board costs per student per day of $8.00, i.e., $48 for six days. Thus total room and board costs for 60,500 "courses" equal $2,904,000 ($48 x 60,500).

As in Line 9, the exchange rate of 2.5 and the conversion to United States prices (60% higher) yields a total tuition cost of $4,114,000

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[26] The cost of sending a 2-pound package, 2nd class in the United Kingdom is £0.23. The corresponding 4th-class parcel post rate in California to zone 4 is $0.75 and to zone 5 is $0.80. Averaging between zones and comparing yields a ratio of U.S. postal rates/U.K. postal rates of 1.35 $\left[\frac{.775}{.23 \times 2.5}\right]$.

(£17 x 2.5 x 1.6 x 60,500). Total summer school costs, therefore, amount to $7,018,000 ($2,904,000 + $4,114,000).

Line 11. Data Processing Costs

Data processing costs are also not significantly different between the United States and the United Kingdom where £3 per student is the cost. The United States equivalent total therefore is $412,500 (£3 x 2.5 x 55,000). It should be noted that data processing costs do not change significantly with the number of courses taken by each student.

Line 12. Examination Costs

Examination costs in the United Kingdom are £2 per student course. Using the 1.6 labor-cost ratio and the exchange rate yields a United States equivalent of $8.00 per student course.

If the same percentage of finally enrolled students taking the examination in the United Kingdom Open University is assumed for the United States Open University (79%), approximately 48,000 examinations out of the 60,500 courses will be taken, producing a total cost in this category of $384,000 ($8,000 x 48,000).

Line 13. Regional Administration Costs

The costs in this category are for regional administrators whose number is a function of the number of students (i.e., the variable cost part of regional administration costs). The United Kingdom total is again adjusted to take into account differences in the labor cost and student population ratios; the exchange rate is used to convert this figure to United States prices. Total costs for Line 13 are, therefore, $2,966,400 (£515,000 x 1.6 x 1.44 x 2.5).

Line 14. Study Center Rentals

As with broadcasting costs, research in this area of rental of existing educational facilities during evenings and weekends produced wide variation

in potential costs. The University of California, for example, stated that university buildings would be provided at zero cost for bona fide educational purposes, and indeed the whole topic of community colleges providing for local education needs dictates fuller utilization of existing facilities at marginal cost. A fee would be assessed only in cases where additional university or college resources would be required, such as personnel operating video equipment, etc.

Since the bulk of Open University tutorial sessions would not require extra janitorial or other services, it could be assumed that for all or most of California, rental charges would be close to zero. At the other extreme, however, one university planning for continuing education classes stated it would charge an annual rental fee of $4,500 for 100 students. If such a rate were applied to the 60,500 "courses," rental charges would total $2,722,500 ($4,500 x 60,500 ÷ 100). The expected cost for rentals undoubtedly lies somewhere within the limits of zero to $3 m. Arbitrarily, a figure of $1.5 m has been chosen.

Line 15. Total Variable Costs

Total variable costs are the summation of the costs for Lines 8 through 14 and equal $25,998,000.

Line 16. Total Costs

Total costs which equal total fixed costs (Line 7) and total variable costs (Line 15) equal $43,511,000.

United States Conventional University Teaching Costs

The data used to provide the first estimate of total teaching costs in public and private colleges and universities in the United States have been taken from June O'Neill's detailed report, Resource Use in Higher Education.[27]

[27] June O'Neill, Resource use in higher education: Trends in outputs and inputs, 1930 to 1967. A report prepared for the Carnegie Commission on Higher Education, 1947 Center Street, Berkeley, California, 1971.

The base unit used for calculating costs is a "credit hour," and the average cost of the unit in 1966-67 prices is $50.1. The average number of such units taken per year by a full-time undergraduate student is 28, and four years of full-time study is required to graduate. Thus the cost of a basic undergraduate degree to the graduating individual (or the authority paying for that degree) is $5,611 ($50.1 x 28 x 4) which equals $6,845 ($5,611 x 1.22) in 1971 prices.[28] The corresponding figures for United States private colleges and universities (approximately one-third of the total) are $60.4 per credit hour and $6,765 and $8,253 per degree in 1967 and 1971 prices respectively. The $6,845 figure would also be the cost per graduate if all initially enrolling students were to graduate. If steady-state equilibrium were assumed, the cost per graduate could also be calculated by dividing annual total costs by the number of graduates. For example, total costs for 1966-67 were estimated at $8,073.6 m[29] and individual cost of obtaining a degree was $5,611. Thus the number of graduates, assuming zero attrition, was 1,438,888 out of a total student body of 5.75 m (1,438,888 x 4), i.e., one-quarter graduating each year. In reality, of course, the number of initially enrolling students who actually graduate is much less than 100%. If the dropout rate were 50%, costs per graduate would rise by from 50% to 100%, depending on how much of the degree program the average dropout completes.

The actual number of graduates in 1967 was 749,000,[30] and the total instructional cost in that year was estimated at $8,073.6 m. Thus the costs per graduate, again assuming a steady-state student body, were $10,480, in 1967. Allowing for the price difference, the figure per graduate becomes $13,152 ($10,780 x 1.22) in 1971 prices.

In comparing United States Open University costs with those of conventional universities, one should note that the United States Open University consists of a student body similar in composition by faculty (i.e., proportions of

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[28] 1966/67 prices are converted into 1971 prices by multiplying by 1.22. See the GNP implicit price deflators--Economic report of the president, 1972, p. 198.

[29] O'Neill, op. cit., p. 91.

[30] U. S. Office of Education, Digest of educational statistics, Washington, D.C., 1968, p. 69.

students in each faculty--27% in Science and Technology and 73% in Arts and Social Science) to the United Kingdom Open University, while no such adjustments have been made for the conventional United States "average" university.

Although it would be desirable if resources were available to make such adjustments, as was seen in the United Kingdom, costs would not alter significantly; such changes that would occur are insignificant within the margin of uncertainty which currently exists and has been discussed above.

Table IV-G summarizes the United States comparisons.

Thus there appears little doubt that teaching costs in an open university are significantly lower compared with conventional universities. It should also be recalled that upper cost estimates have been adopted for the Open University and that a reduction in these costs by 10 percent, which may be quite feasible, reduces the annual total teaching costs per full-time student equivalent to $1,294.

Other areas of potential cost savings involve the substitution of relatively cheaper factor inputs for the more expensive, abandoning those inputs which are not cost effective, and taking advantage of economies of scale in the much larger populations in the United States.

If television and radio output, for example, prove to be relatively cheap in the United States, and if extensive use can be made of the wide network of central computers and computer facilities within existing institutions of higher learning, significant economies may be released by substituting this capital for the relatively expensive labor inputs involved in regular tuition and in summer school. It is also not clear that summer schools, themselves a very costly Open University item, are necessary or worth the expense. The original idea of summer schools in the United Kingdom model, as has been seen, was to provide the part-time student with some experience of university life and some doubt is now being cast on the value of these sessions in the United Kingdom. It the United States, a much larger portion of the potential Open University population will have had prior access to institutions of higher learning with the result that the advantage claimed for summer schools is lessened.

Table IV-G

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Costs in Conventional and Open Universitites

United States	Annual total teaching costs per full-time student equivalent
Open University	$1,438[a]
Conventional University	1,711
Private University	2,063

[a] Total annual costs of $43,511,000 (Table IV-A): 60,500 - 2, i.e., 1 full-time conventional student = 2 Open University students. As discussed previously, different student equivalence ratios would yield different relative costs.

Abandoning summer schools, in itself, reduces total annual costs by over $7 m (16%). It should be recalled that the United Kingdom Open University does not pay any of the costs of the summer schools; these costs are borne by the individual student or his local education authority and consequently, despite the tight Open University budget situation, there is little incentive for the Open University either to evaluate the benefits of these summer schools or abolish them. One possibility would be to make summer schools optional but to encourage those students who might benefit from them sufficiently to enroll in the summer program at their own expense.

If in terms of potential economies of scale, it proves to be the case that the fixed costs of $17,513,000 in Table IV-A could support more than 55,000 students, the marginal cost of teaching each additional full-time equivalent student would be only $860 (i.e., variable costs ÷ 30,250).

At this stage, these figures must be treated as only best estimates and may have to be refined in the light of developments in the United Kingdom and/or a more intensive research effort in the United States.